

Getting Started with Algebra

Activities & Worksheets

for Adult Basic Education Students



Denise Reddington

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Having worked with adult education students for many years, I've dealt with a lot of math anxiety, especially when it comes to algebra. Students who one day hope to pass a high school equivalency test or attend community college need to develop strong algebra and algebraic thinking skills. Algebra skills are also a helpful tool when it comes to problem solving, another skill students will need to develop if they hope to achieve their goal.

One way that I have found to calm a student's anxiety is to introduce beginning algebra alongside whole numbers, fractions, and decimals. Students soon discover that algebra is something they "can do" and understand. It's also important to relate new algebra concepts to everyday life and use it as a method to solve problems that students can relate to. Integrating beginning algebra into ABE math classes also reinforces the whole number, decimal, and fraction skills students will be learning. Most importantly, the more early success that students experience working with basic algebra, the more their confidence grows and their math skills develop.

I often experience difficulty finding suitable beginning algebra activities and worksheets for adult students, lessons that look at one skill at a time, define basic vocabulary, and include a lot of practice and examples. I've also experienced difficulty finding lessons and worksheets that relate beginning algebra skills to real life and demonstrate how these skills can be used to solve problems. I decided to develop some of my own activities and worksheets as well as thoroughly explore what is already useful and available online. I'm grateful that the NH Bureau of Adult Education sponsored and supported my effort.

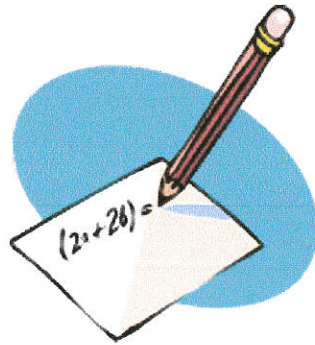
This booklet is by no means comprehensive or all inclusive. I hope the activities and worksheets included will help you enhance your students' understanding of beginning algebra and make the journey a little more enjoyable.

What is Algebra?

Algebra is a branch of mathematics that includes the use of variables (an unknown quantity) to express rules about numbers, number relationships, and operations.

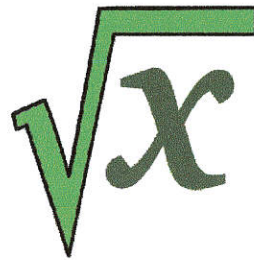
Algebra is a math language.

Algebra is a powerful problem-solving tool.



Exponents, Finding a Square Root, and Scientific Notation

different ways to write very large
and very small numbers



65000000.

7 6 5 4 3 2 1



6.5×10^7

exponent
 3^2
base

Exponents

Exponents are a short way of writing numbers. An exponent is the number that tells how many equal factors there are. It tells you how many times to multiply the base number by itself.

5^2 5 is the base number and 2 is the exponent

5^2 is read: 5 squared or 5 to the second power

$$\mathbf{5^2 = 5 \times 5 = 25} \quad \mathbf{5^2 = 25}$$

$$\mathbf{5^3 = 5 \times 5 \times 5 = 125} \quad \mathbf{5^3 = 125}$$

5^3 is read 5 cubed or 5 to the 3rd power

An exponent can be **any** number:

$$\mathbf{5^4 = 5 \times 5 \times 5 \times 5 = 625}$$

Try the following:

1. $4^2 =$ _____

2. $4^3 =$ _____

3. $3^3 =$ _____

4. $3^2 =$ _____

5. $8^3 =$ _____

6. $10^2 =$ _____

7. $10^3 =$ _____

8. $10^4 =$ _____

9. $10_5 =$ _____

Name _____

Date _____

Exponents

$5^2 = 5 \times 5 = 25$ **5 is the base number and 2 is the exponent.**
The exponent tells you how many times to multiply the base number by itself.

Find the value.

1. $2^2 =$	2. $4^2 =$
3. $3^2 =$	4. $8^2 =$
5. $6^2 =$	6. $5^2 =$
7. $9^2 =$	8. $10^2 =$
9. $7^2 =$	10. $5^3 =$
11. $2^3 =$	12. $3^3 =$
13. $11^2 =$	14. $4^3 =$
Use a Calculator for the following :	
15. $14^2 =$	16. $15^2 =$
17. $8^3 =$	18. $10^3 =$
19. $12^3 =$	20. $10^5 =$

1^2	1
2^2	4
3^2	9
4	16
5^2	25
6^2	36
7^2	49
8^2	64
9^2	81
10^2	100
11^2	121
12^2	144

EXPONENT MATCH

Cut along the lines. Have students match the exponents to their value. This activity can be completed independently or as a team. They can also be used as flashcards.

The “I Have...Who Has” Game

The goal of this game is to provide experience in mental mathematics and to keep skills, concepts, and vocabulary in the minds of the students. It's also a fun way to review and reinforce new concepts. I have included an exponents game that I made using the website ihavewhohasgames.com. You will also find an “I Have.....Who Has” game that uses algebraic expressions in the corresponding section of this booklet.

Directions

Distribute all cards to students. If necessary, some students may have more than one card since all question cards need to be handed out. The teacher then asks any student to begin by reading his/her card. A statement is read first (example: “I have 7.”) followed by a question (example: “Who has the sum of 3 and 6?”) The students all look at their cards. The one with the answer to the question then reads his/her card. This continues around the group until the student who had the first card reads again. The questions are done in a circular fashion which brings them back to the starter card. To make the game longer each student may have more than one card. Just remember that the last question must lead back to the original starting card.

An individual student could also match up the cards in a loop for review and reinforcement.

A blank template page for making your own cards can be found on the following page.

I have

Who has

I have

Who has

I have

Who has

I have

Who has

I have

Who has

I have

Who has

I have

Who has

I have

Who has

I Have 25	Who Has? 10 squared
I Have 100	Who Has? 3 squared
I Have 9	Who Has? 6 to the second power
I Have 36	Who Has? 2 to the third power

<p>I Have</p> <p>8</p>	<p>Who Has?</p> <p>3 cubed</p>
<p>I Have</p> <p>27</p>	<p>Who Has?</p> <p>4 squared</p>
<p>I Have</p> <p>16</p>	<p>Who Has?</p> <p>5 to the third power</p>
<p>I Have</p> <p>125</p>	<p>Who Has?</p> <p>12 squared</p>

<p>I Have</p> <p>144</p>	<p>Who Has?</p> <p>7 to the second power</p>
<p>I Have</p> <p>49</p>	<p>Who Has?</p> <p>10 cubed</p>
<p>I Have</p> <p>1000</p>	<p>Who Has?</p> <p>8 squared</p>
<p>I Have</p> <p>64</p>	<p>Who Has?</p> <p>2 to the second power</p>

I Have 4	Who Has? 11 squared
I Have 121	Who Has? 9 squared
I Have 81	Who Has? 5 squared

make your own games free at : ihavewhohasgames.com

Finding a Square Root

Finding the square root of a number is the opposite of finding the power of a number.

$$\sqrt{25} = ?$$

To find the square root ask yourself: what number times itself will give you 25.

$$\sqrt{25} = 5 \text{ because } 5 \times 5 = 25$$

Find the square root of the following numbers:

1. $\sqrt{9} = \underline{\hspace{2cm}}$

2. $\sqrt{81} = \underline{\hspace{2cm}}$

3. $\sqrt{36} = \underline{\hspace{2cm}}$

4. $\sqrt{100} = \underline{\hspace{2cm}}$

5. $\sqrt{16} = \underline{\hspace{2cm}}$

6. $\sqrt{49} = \underline{\hspace{2cm}}$

7. $\sqrt{144} = \underline{\hspace{2cm}}$

8. $\sqrt{64} = \underline{\hspace{2cm}}$

Not all square roots are perfect.

What do you think the square root of 30.25 is?

$$\sqrt{30.25} = \underline{\hspace{2cm}}$$

What 2 whole numbers does the square root of 20 fall between?

Square Roots (A)

Instructions: Find the square root of each integer.

$$\sqrt{441} = \quad \sqrt{225} = \quad \sqrt{64} = \quad \sqrt{81} =$$

$$\sqrt{36} = \quad \sqrt{961} = \quad \sqrt{729} = \quad \sqrt{676} =$$

$$\sqrt{169} = \quad \sqrt{841} = \quad \sqrt{529} = \quad \sqrt{784} =$$

$$\sqrt{900} = \quad \sqrt{196} = \quad \sqrt{625} = \quad \sqrt{9} =$$

$$\sqrt{1024} = \quad \sqrt{256} = \quad \sqrt{16} = \quad \sqrt{49} =$$

$$\sqrt{576} = \quad \sqrt{484} = \quad \sqrt{144} = \quad \sqrt{121} =$$

$$\sqrt{324} = \quad \sqrt{361} = \quad \sqrt{400} = \quad \sqrt{100} =$$

$$\sqrt{25} = \quad \sqrt{1} = \quad \sqrt{4} = \quad \sqrt{289} =$$

Square Roots (A) Answers

Instructions: Find the square root of each integer.

$$\sqrt{441} = 21 \quad \sqrt{225} = 15 \quad \sqrt{64} = 8 \quad \sqrt{81} = 9$$

$$\sqrt{36} = 6 \quad \sqrt{961} = 31 \quad \sqrt{729} = 27 \quad \sqrt{676} = 26$$

$$\sqrt{169} = 13 \quad \sqrt{841} = 29 \quad \sqrt{529} = 23 \quad \sqrt{784} = 28$$

$$\sqrt{900} = 30 \quad \sqrt{196} = 14 \quad \sqrt{625} = 25 \quad \sqrt{9} = 3$$

$$\sqrt{1024} = 32 \quad \sqrt{256} = 16 \quad \sqrt{16} = 4 \quad \sqrt{49} = 7$$

$$\sqrt{576} = 24 \quad \sqrt{484} = 22 \quad \sqrt{144} = 12 \quad \sqrt{121} = 11$$

$$\sqrt{324} = 18 \quad \sqrt{361} = 19 \quad \sqrt{400} = 20 \quad \sqrt{100} = 10$$

$$\sqrt{25} = 5 \quad \sqrt{1} = 1 \quad \sqrt{4} = 2 \quad \sqrt{289} = 17$$

Scientific Notation

SCIENTIFIC NOTATION is a way of writing very large numbers or very small decimals. The numbers are expressed as a product of a number between 1 and 10 and a power of 10.

1. **Example:** Write 12,300,000 in scientific notation.

Move the decimal point to the left until it lands between the 1 and 2.

Answer: 1.23×10^7 because the decimal point moved left 7 places.

PRACTICE: Write each number in scientific notation:

1) 456,000

2) 25,000,000

3) ten million

4) 200,000 human cells could fit on the head of a pin. Write this number in scientific notation.

2. **Example:** Write .00012345 in scientific notation.

Move the decimal point to the right until it lands between 1 and 2.

Answer: 1.2345×10^{-4} because the decimal point moved right four places.

PRACTICE: Write each number in scientific notation:

5) .00005

6) .000012

7) .0000123

8) Human hair grows .0000000108 miles per hour. Write this number in scientific notation.

3. **Example:** Write 7.2×10^5 in standard notation

Answer: 720,000 because the decimal point moved right five places.

PRACTICE: Write each number in standard notation:

9) 4.7×10^6

10) 7.123×10^3

11) A super computer can perform 2.5×10^9 operations per second. Write this number in standard notation.

4. **Example:** Write 9×10^{-5} in standard notation.

Answer: .00009 because the decimal point moved to the left 5 places.

PRACTICE: Write each number in standard notation:

12) 5.17×10^{-4}

13) 1.9×10^{-6}

14) The diameter of a flu virus is approximately 6.047×10^{-5} . Write in standard notation.

Adapted from floridatechnet.org

Name _____

Date _____

Scientific Notation

In the first part, write the number in scientific notation.

In the second part, write the scientific notation number in standard form.

1. 718,900	2. 0.0035
3. 900,000	4. 0.009
5. 12,000	6. 83,470
7. 0.0025	8. 990,000
9. 2,900,000	10. .00025
11. 0.05	12. 0.2400

13. 4.4×10^5	14. 3.65×10^4
15. 8.5×10^3	16. 1.5×10^{-2}
17. 4.4×10^5	18. 6×10^{-2}
19. 9.2×10^5	20. 2.9×10^5
21. 6.98×10^3	22. 3×10^{-3}
23. 2.2×10^{-1}	24. 3.7×10^3

Name ANSWERS

Date _____

Scientific Notation

In the first part, write the number in scientific notation.

In the second part, write the scientific notation number in standard form.

1. 718,900	7.189×10^5	2. 0.0035	3.5×10^{-3}
3. 900,000	9×10^5	4. 0.009	9×10^{-3}
5. 12,000	1.2×10^4	6. 83,470	8.347×10^4
7. 0.0025	2.5×10^{-3}	8. 990,000	9.9×10^5
9. 2,900,000	2.9×10^6	10. .00025	2.5×10^{-4}
11. 0.05	5×10^{-2}	12. 0.2400	2.4×10^{-1}

13. 4.4×10^5	440,000	14. 3.65×10^4	36,500
15. 8.5×10^3	8,500	16. 1.5×10^{-2}	.015
17. 4.4×10^5	440,000	18. 6×10^{-2}	.06
19. 9.2×10^5	920,000	20. 2.9×10^5	290,000
21. 6.98×10^3	6,980	22. 3×10^{-3}	.003
23. 2.2×10^{-1}	.22	24. 3.7×10^3	3,700

Scientific Notation

One of the many practical uses for exponents and powers of ten is scientific notation. Scientists often work with very large numbers and very small numbers. Scientific notation makes it easier for scientists to record such data.

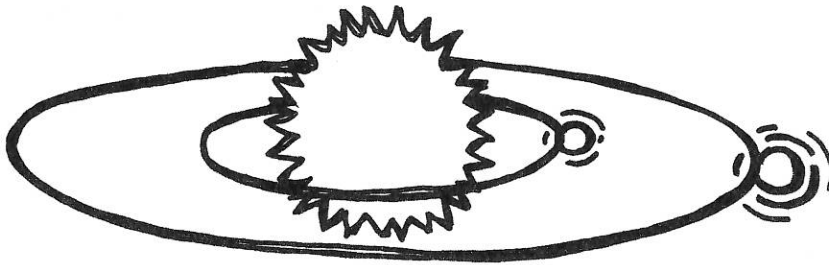
Below are a few examples of numbers written in scientific notation:

Distance from the Earth to the sun— 9.296×10^7 miles

Speed of light through air— 2.99×10^8 meters/second

Diameter of a hydrogen atom— 1.06×10^{-9} meters

Mass of an electron— 9.0×10^{-19} mg



When you investigated the patterns of the powers of ten, you found that the only thing that changed was the placement of the decimal point. When the exponent is positive, the decimal point moves to the right making the number larger. When the exponent is negative, the decimal point moves to the left making the number smaller. The exponent also tells the number of places to move the decimal point.

$$6.175 \times 10^5 = 6.175 \times 100,000 = 617,500.$$

$$4.1 \times 10^{-5} = 0.000041$$

When a number is written in scientific notation, it is written as a decimal with only one digit before the decimal point. This number is multiplied by a power of ten that causes the decimal point to be moved back to its original place.

$$6,000,000,000 = 6.0 \times 10^9$$

$$0.00000000127 = 1.27 \times 10^{-9}$$

From:

Name _____

Scientific Notation Practice

Write the following numbers represented in scientific notation.

1. The distance from the Earth to the sun is 9.296×10^7 miles.
2. The speed of light through air is 2.99×10^8 meters/second.
3. The diameter of a hydrogen atom is 1.06×10^{-9} meters.
4. The mass of an electron is about 9.0×10^{-19} mg.
5. The mass of the Earth is about 5.833×10^{24} kg.

Write the numbers below in scientific notation.

6. The distance from Jupiter to the sun is 483,600,000 miles.
7. The speed of light through diamonds is 124,000,000 meters/second.
8. An average cell is about 0.0025 centimeters long.
9. 0.00000005 of the Earth's atmosphere is helium.
10. The mass of Mars is about 629,481,000,000,000,000,000 kg.

FROM:

The Order of Operations

The rules that make sure everyone does math problems in the same way

$$5^2 + 10 \times 6 - 3 \times 2 =$$

?

210? 414? 164? 79?

PEMDAS Rules

Evaluate the problem in the following order:

- 1) **P** - **Parentheses**
- 2) **E** - **Exponents** (Powers and Square Roots)
- 3) **MD** - **Multiplication and Division** (Left to Right)
- 4) **AS** - **Addition and Subtraction** (Left to Right)

You can remember the order by saying :

Please Excuse My Dear Aunt Sally

a	x	u	i	d	u
r	p	l	v	d	b
e	o	t	i	i	t
n	n	i	s	t	r
t	e	p	i	i	a
h	n	l	o	o	c
e	t	i	n	n	t
s	s	c			i
e		a			o
s		t			n
		i			
		o			
		n			



Name: _____

Order of Operations

When you have different operations in a math problem, you need to solve them in a specific order.

Step 1: Solve the part in parenthesis ().

Step 2: Multiply and divide.

Step 3: Add and subtract.

1. $(9 + 3) \div 2 =$ _____

2. $6 - 1 \times 4 =$ _____

3. $(2 \times 5) - 4 =$ _____

4. $36 - (4 + 8) \div 4 =$ _____

5. $50 - 5 \times (27 \div 3) =$ _____

6. $15 + 24 \div (8 - 2) =$ _____

5. Do $(12 + 6) \div 2$ and $12 + 6 \div 2$ have the same answer? Explain why.

ANSWER KEY

Order of Operations

When you have different operations in a math problem, you need to solve them in a specific order.

Step 1: Solve the part in parenthesis ().

Step 2: Multiply and divide.

Step 3: Add and subtract.

1. $(9 + 3) \div 2 = 6$

2. $6 - 1 \times 4 = 2$

3. $(2 \times 5) - 4 = 6$

4. $36 - (4 + 8) \div 4 = 33$

5. $50 - 5 \times (27 \div 3) = 5$

6. $15 + 24 \div (8 - 2) = 19$

5. Do $(12 + 6) \div 2$ and $12 + 6 \div 2$ have the same answer? Explain why.

No, the answers are different. In the first problem, you add 12 + 6 first. In the second problem, you divide 6 and 2 first.

Name: _____

Order of Operations

Step 1: Multiply and divide, from left to right.

Step 2: Add and subtract, from left to right.

Solve.

1. $3 \times 5 + 6 =$ _____

2. $28 \div 4 - 6 =$ _____

3. $16 + 24 \div 6 =$ _____

4. $9 \times 0 + 6 - 3 =$ _____

5. $3 - 0 \div 6 + 13 =$ _____

6. $3 \times 9 - 5 \times 2 =$ _____

7. $7 \times 8 + 36 \div 9 =$ _____

8. $2 + 7 - 9 + 11 =$ _____

Tell whether each pair of expressions is equal or unequal. Write an equal sign (=) or not equal sign (\neq) on each line.

9. $8 \times 6 - 10$ _____ $8 + 6 \times 10$

10. $10 \times 2 \times 3$ _____ $3 \times 2 \times 10$

11. $17 - 35 \div 7$ _____ $10 \times 1 + 9 - 7$

12. $12 - 72 \div 9 + 4$ _____ $72 \div 9 + 4 - 12$

13. $15 - 15 \div 3$ _____ $9 \times 3 - 17$

14. $3 \times 3 \times 2 \div 1$ _____ $3 \div 1 \times 3 \times 2$

15. $8 + 8 + 8 + 8$ _____ $4 \times 2 + 8 + 8$

16. $3 \times 4 + 7 \div 1$ _____ $100 \div 10 - 9$

ANSWER KEY

Order of Operations

Step 1: Multiply and divide, from left to right.

Step 2: Add and subtract, from left to right.

Solve.

1. $3 \times 5 + 6 = 21$

2. $28 \div 4 - 6 = 1$

3. $16 + 24 \div 6 = 20$

4. $9 \times 0 + 6 - 3 = 3$

5. $3 - 0 \div 6 + 13 = 16$

6. $3 \times 9 - 5 \times 2 = 17$

7. $7 \times 8 + 36 \div 9 = 60$

8. $2 + 7 - 9 + 11 = 11$

Tell whether each pair of expressions is equal or unequal. Write an equal sign (=) or not equal sign (\neq) on each line.

9. $8 \times 6 - 10 \neq 8 + 6 \times 10$
38 68

10. $10 \times 2 \times 3 = 3 \times 2 \times 10$
60 60

11. $17 - 35 \div 7 = 10 \times 1 + 9 - 7$
12 12

12. $12 - 72 \div 9 + 4 \neq 72 \div 9 + 4 - 12$
8 0

13. $15 - 15 \div 3 = 9 \times 3 - 17$
10 10

14. $3 \times 3 \times 2 \div 1 = 3 \div 1 \times 3 \times 2$
18 18

15. $8 + 8 + 8 + 8 \neq 4 \times 2 + 8 + 8$
32 24

16. $3 \times 4 + 7 \div 1 \neq 100 \div 10 - 9$
19 1

Name: _____

Order of Operations

When you have different operations in a math problem, you need to solve them in a specific order.

Step 1: Solve the part in parenthesis () and find the value of the exponents.

Step 2: Multiply and divide, from left to right.

Step 3: Add and subtract, from left to right.

Solve.

1. $(26 + 2) \div 7 =$ _____

2. $9^2 - (8 \times 9) =$ _____

3. $7 + (30 \div 5) + 7 =$ _____

4. $22 - 1 \times 5 + 4^2 =$ _____

5. $75 - 5^2 + (18 \div 9) =$ _____

6. $15 + 36 \div (2 + 2^2) =$ _____

5. Do $4 \times (1 + 3^2)$ and $4 \times (1 + 3)^2$ have the same answer? Explain.

ANSWER KEY

Order of Operations

When you have different operations in a math problem, you need to solve them in a specific order.

Step 1: Solve the part in parenthesis () and find the value of the exponents.

Step 2: Multiply and divide, from left to right.

Step 3: Add and subtract, from left to right.

Solve.

1. $(26 + 2) \div 7 = 4$

2. $9^2 - (8 \times 9) = 9$

3. $7 + (30 \div 5) + 7 = 20$

4. $22 - 1 \times 5 + 4^2 = 33$

5. $75 - 5^2 + (18 \div 9) = 52$

6. $15 + 36 \div (2 + 2^2) = 21$

5. Do $4 \times (1 + 3^2)$ and $4 \times (1 + 3)^2$ have the same answer? Explain.

No, the answers are different. In the first expression, you would square the number three first. In the second expression, you would square the sum of one and three first. This would cause the answers to be different.

Name : _____ Score : _____

Teacher : _____ Date : _____

Order of Operations

1) $(10 \times 2 - 8^2) - 2$

6) $(8 - 2)^2 + (8 \div 4)$

2) $(9 - 3)^2 + (12 \div 4)$

7) $4 \times (14 - 3) - 6^2$

3) $(54 - 4) \div 25 - 6^2$

8) $(36 - 2^2) \div (20 - 4)$

4) $(6 \times 5 + 5^2) - 2$

9) $3 \times (10 + 2) - 9^2$

5) $(53 - 5) \div 24 + 2^2$

10) $(75 - 5^2) \div (6 + 4)$



Name : _____

Score : _____

Teacher : _____

Date : _____

Order of Operations

$$\begin{aligned}
 1) & (10 \times 2 - 8^2) - 2 \\
 & (10 \times 2 - 64) - 2 \\
 & (20 - 64) - 2 \\
 & -44 - 2 \\
 & -46
 \end{aligned}$$

$$\begin{aligned}
 6) & (8 - 2)^2 + (8 \div 4) \\
 & 6^2 + 2 \\
 & 36 + 2 \\
 & 38
 \end{aligned}$$

$$\begin{aligned}
 2) & (9 - 3)^2 + (12 \div 4) \\
 & 6^2 + 3 \\
 & 36 + 3 \\
 & 39
 \end{aligned}$$

$$\begin{aligned}
 7) & 4 \times (14 - 3) - 6^2 \\
 & 4 \times 11 - 6^2 \\
 & 4 \times 11 - 36 \\
 & 44 - 36 \\
 & 8
 \end{aligned}$$

$$\begin{aligned}
 3) & (54 - 4) \div 25 - 6^2 \\
 & 50 \div 25 - 6^2 \\
 & 50 \div 25 - 36 \\
 & 2 - 36 \\
 & -34
 \end{aligned}$$

$$\begin{aligned}
 8) & (36 - 2^2) \div (20 - 4) \\
 & (36 - 4) \div (20 - 4) \\
 & 32 \div 16 \\
 & 2
 \end{aligned}$$

$$\begin{aligned}
 4) & (6 \times 5 + 5^2) - 2 \\
 & (6 \times 5 + 25) - 2 \\
 & (30 + 25) - 2 \\
 & 55 - 2 \\
 & 53
 \end{aligned}$$

$$\begin{aligned}
 9) & 3 \times (10 + 2) - 9^2 \\
 & 3 \times 12 - 9^2 \\
 & 3 \times 12 - 81 \\
 & 36 - 81 \\
 & -45
 \end{aligned}$$

$$\begin{aligned}
 5) & (53 - 5) \div 24 + 2^2 \\
 & 48 \div 24 + 2^2 \\
 & 48 \div 24 + 4 \\
 & 2 + 4 \\
 & 6
 \end{aligned}$$

$$\begin{aligned}
 10) & (75 - 5^2) \div (6 + 4) \\
 & (75 - 25) \div (6 + 4) \\
 & 50 \div 10 \\
 & 5
 \end{aligned}$$



Name _____

Date _____

Order of Operations III

1. $7 \times (9 + 3) \times 1$	2. $62 + 5 \times 12 / 2$
3. $90 - 40 + 40 \times 2^2$	4. $24 \div 2 + 5^2$
5. $75 + 25 - 10 / 5$	6. $1 + 5 \times 9 \div 9$
7. $(81 \times 2) - 4^2$	8. $24 - 2^2 \times 5$
9. $5(10 + 10) \div 10$	10. $(88 + 5) + 15 \times (3 - 1)$
11. $3(15 + 25) + 35 \div 7$	12. $47 - 27 + 5^2 \times 2$

13. $90 - 1 \times 2^2$	14. $12 + 60 \div 6 \times 52$
15. $9^2 - 5 \times 12$	16. $56 \div 8 \times 4 \times 0$
17. $(8 + 2)^2 - 50 + 5 \times 2$	18. $12 + (12 \div 4)^2 - 3$
19. $100 \times 4 - 25 \times 2^3$	20. $(50 + 5) \times 2 - 5 \times 2$

FOLLOW THE ORDER OF OPERATIONS

1. Do what's in Parenthesis first ()
2. Do all Exponents and square roots
3. Multiply and Divide, left to right, *whichever comes first*
4. Add and Subtract, left to right, *whichever comes first*

Please Excuse My Dear Aunt Sally

Name ANSWERS

Date _____

Order of Operations III

1. $7 \times (9 + 3) \times 1$ 84	2. $62 + 5 \times 12 / 2$ 92
3. $90 - 40 + 40 \times 2^2$ 210	4. $24 \div 2 + 5^2$ 37
5. $75 + 25 - 10 / 5$ 98	6. $1 + 5 \times 9 \div 9$ 6
7. $(81 \times 2) - 4^2$ 146	8. $24 - 2^2 \times 5$ 4
9. $5(10 + 10) \div 10$ 10	10. $(88 + 5) + 15 \times (3 - 1)$ 123
11. $3(15 + 25) + 35 \div 7$ 125	12. $47 - 27 + 5^2 \times 2$ 70

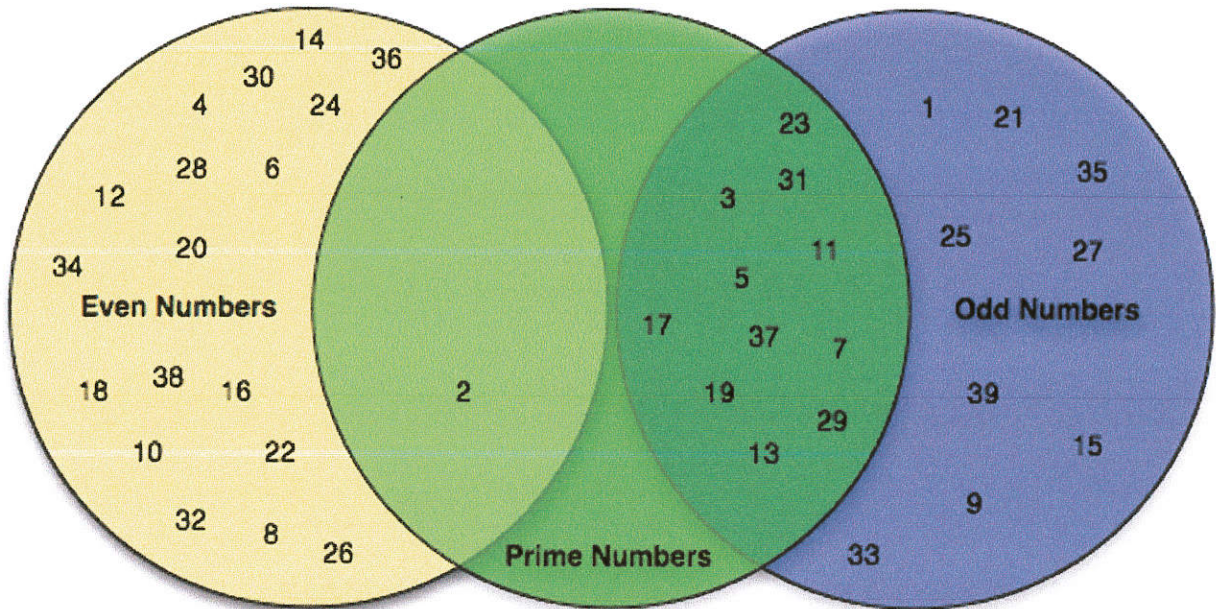
13. $90 - 1 \times 2^2$ 86	14. $12 + 60 \div 6 \times 52$ 532
15. $9^2 - 5 \times 12$ 21	16. $56 \div 8 \times 4 \times 0$ 0
17. $(8 + 2)^2 - 50 + 5 \times 2$ 60	18. $12 + (12 \div 4)^2 - 3$ 18
19. $100 \times 4 - 25 \times 2^3$ 200	20. $(50 + 5) \times 2 - 5 \times 2$ 100

FOLLOW THE ORDER OF OPERATIONS

1. Do what's in Parenthesis first ()
2. Do all Exponents and square roots
3. Multiply and Divide, left to right, *whichever comes first*
4. Add and Subtract, left to right, *whichever comes first*

Please Excuse My Dear Aunt Sally

Numbers, Numbers, Numbers



PlanetMike.com

Numbers, Numbers, Numbers

1. An **even number** can be divided by 2 evenly.

Write 5 examples of an even number _____

Circle the even numbers below:

102 465 881 1660 8889 914 1056 65 808

2. An **odd number** cannot be divided by 2 evenly.

Write 5 examples of an odd number: _____

Circle the odd numbers below:

9 29 98 221 687 643 12,330 606 15,004

3. A **prime number** can only be divided evenly by 1 or itself. Prime numbers only have 2 factors*, 1 and itself.

Write 5 examples of prime numbers: _____

Circle the prime numbers below:

3 9 19 33 12 55 100 101 7 77 72

4. **Composite numbers** are numbers that have more than 2 factors.

Numbers that are not prime numbers are composite numbers.

10 is an example of a composite number because the number 10 has 4 factors*: 1, 2, 5 and 10.

*******Factors** are numbers that you multiply to get another number.

$5 \times 2 = 10$ so 5 and 2 are factors of 10.

5. **Integers** are whole numbers and their opposites (5 and -5 are both integers). Write 6 examples of integers: _____

Name: _____

Odd or Even?

Odd numbers end with these digits: 1, 3, 5, 7, or 9

Even numbers end with these digits: 0, 2, 4, 6, or 8

Directions: Tell whether each number is odd or even.

- | | | | |
|--------|-------|----------|-------|
| a. 6 | _____ | b. 36 | _____ |
| c. 23 | _____ | d. 74 | _____ |
| e. 54 | _____ | f. 0 | _____ |
| g. 98 | _____ | h. 952 | _____ |
| i. 100 | _____ | j. 500 | _____ |
| k. 41 | _____ | l. 67 | _____ |
| m. 20 | _____ | n. 89 | _____ |
| o. 72 | _____ | p. 58 | _____ |
| q. 41 | _____ | r. 714 | _____ |
| s. 9 | _____ | t. 1,378 | _____ |

An apple tree has 62 apples on it.

Are there an odd or even number of apples on the tree? _____

Samantha has 17 cookies.

Does she have an odd or even number of cookies? _____

Is the sum of $7+3$ odd or even? _____

Name: _____

Odd or Even?

Odd numbers end with these digits: 1, 3, 5, 7, or 9

Even numbers end with these digits: 0, 2, 4, 6, or 8

Directions: Tell whether each number is odd or even.

- | | | | |
|--------|-------------|----------|-------------|
| a. 6 | <u>even</u> | b. 36 | <u>even</u> |
| c. 23 | <u>odd</u> | d. 74 | <u>even</u> |
| e. 54 | <u>even</u> | f. 0 | <u>even</u> |
| g. 98 | <u>even</u> | h. 952 | <u>even</u> |
| i. 100 | <u>even</u> | j. 500 | <u>even</u> |
| k. 41 | <u>odd</u> | l. 67 | <u>odd</u> |
| m. 20 | <u>even</u> | n. 89 | <u>odd</u> |
| o. 72 | <u>even</u> | p. 58 | <u>even</u> |
| q. 41 | <u>odd</u> | r. 714 | <u>even</u> |
| s. 9 | <u>odd</u> | t. 1,378 | <u>even</u> |

An apple tree has 62 apples on it.

Are there an odd or even number of apples on the tree? even

Samantha has 17 cookies.

Does she have an odd or even number of cookies? odd

Is the sum of $7+3$ odd or even?

even

Name: _____

Prime and Composite

Factors are the numbers you multiply to get another number.

$$2 \times 3 = 6 \quad 2 \text{ and } 3 \text{ are factors of } 6.$$

$$1 \times 6 = 6 \quad 1 \text{ and } 6 \text{ are also factors of } 6.$$

What are the factors of 6? 1, 2, 3, and 6

Prime numbers are the numbers that have only two factors.

$$1 \times 19 = 19 \quad 1 \text{ and } 19 \text{ are the only factors of } 19.$$

Because 19 has only two factors, it is a prime number.

Composite numbers are the numbers that have more than two factors.

$$1 \times 10 = 10 \quad 1 \text{ and } 10 \text{ are factors of } 10.$$

$$2 \times 5 = 10 \quad 2 \text{ and } 5 \text{ are also factors of } 10.$$

What are the factors of 10? 1, 2, 5, and 10

Because 10 has more than two factors, it is a composite number.

- a. List all of the factors for the number **4**. _____
Is **4** a prime or composite number? _____
- b. List all of the factors for the number **11**. _____
Is **11** a prime or composite number? _____
- c. List all of the factors for the number **16**. _____
Is **16** a prime or composite number? _____
- d. List all of the factors for the number **23**. _____
Is **23** a prime or composite number? _____

ANSWER KEY

Prime and Composite

Factors are the numbers you multiply to get another number.

$$2 \times 3 = 6 \quad 2 \text{ and } 3 \text{ are factors of } 6.$$

$$1 \times 6 = 6 \quad 1 \text{ and } 6 \text{ are also factors of } 6.$$

What are the factors of 6? 1, 2, 3, and 6

Prime numbers are the numbers that have only two factors.

$$1 \times 19 = 19 \quad 1 \text{ and } 19 \text{ are the only factors of } 19.$$

Because 19 has only two factors, it is a prime number.

Composite numbers are the numbers that have more than two factors.

$$1 \times 10 = 10 \quad 1 \text{ and } 10 \text{ are factors of } 10.$$

$$2 \times 5 = 10 \quad 2 \text{ and } 5 \text{ are also factors of } 10.$$

What are the factors of 10? 1, 2, 5, and 10

Because 10 has more than two factors, it is a composite number.

a. List all of the factors for the number **4**. 1, 2, and 4

Is **4** a prime or composite number? Composite

b. List all of the factors for the number **11**. 1 and 11

Is **11** a prime or composite number? prime

c. List all of the factors for the number **16**. 1, 2, 4, 8, and 16

Is **16** a prime or composite number? Composite

d. List all of the factors for the number **23**. 1 and 23

Is **23** a prime or composite number? Prime

Name: _____

Finding Factors

Factors are the numbers you multiply to get another number.

$$2 \times 3 = 6$$

2 and 3 are factors of 6.

$$1 \times 6 = 6$$

1 and 6 are also factors of 6.

What are the factors of 6? 1, 2, 3, and 6.

What are the factors of **21**? - 1, 3, 7, and 21

What are the factors of **31**? - 1 and 31

What are the factors of **24**? - 1, 2, 3, 4, 6, 8, 12, and 24

Find all of the factors for each number. List them in order from least to greatest.

a. **15** - _____, _____, _____, _____

b. **25** - _____, _____, _____

c. **3** - _____, _____

d. **27** - _____, _____, _____, _____

e. **18** - _____, _____, _____, _____, _____, _____

f. **12** - _____, _____, _____, _____, _____, _____

Now try these.

g. **21** - _____

h. **31** - _____

i. **49** - _____

j. **16** - _____

k. **33** - _____

l. **20** - _____

m. **17** - _____

n. **4** - _____

ANSWER KEY

Finding Factors

Factors are the numbers you multiply to get another number.

$$2 \times 3 = 6$$

2 and 3 are factors of 6.

$$1 \times 6 = 6$$

1 and 6 are also factors of 6.

What are the factors of 6? 1, 2, 3, and 6.

What are the factors of **21**? - 1, 3, 7, and 21

What are the factors of **31**? - 1 and 31

What are the factors of **24**? - 1, 2, 3, 4, 6, 8, 12, and 24

Find all of the factors for each number. List them in order from least to greatest.

a. **15** - 1, 3, 5, 15

b. **25** - 1, 5, 25

c. **3** - 1, 3

d. **27** - 1, 3, 9, 27

e. **18** - 1, 2, 3, 6, 9, 18

f. **12** - 1, 2, 3, 4, 6, 12

Now try these.

g. **21** - 1, 3, 7, 21

h. **31** - 1, 31

i. **49** - 1, 7, 49

j. **16** - 1, 2, 4, 8, 16

k. **33** - 1, 3, 11, 33

l. **20** - 1, 2, 4, 5, 10, 20

m. **17** - 1, 17

n. **4** - 1, 2, 4

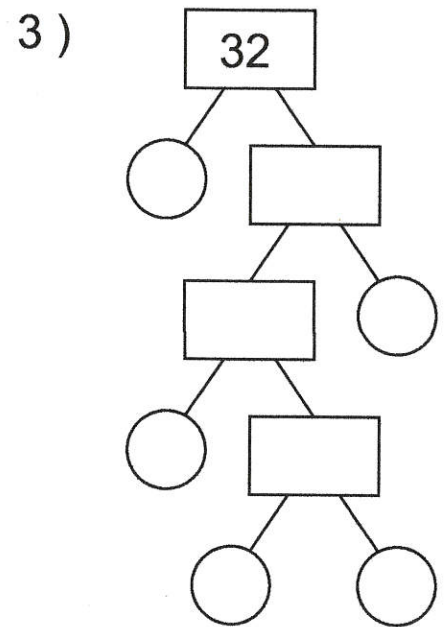
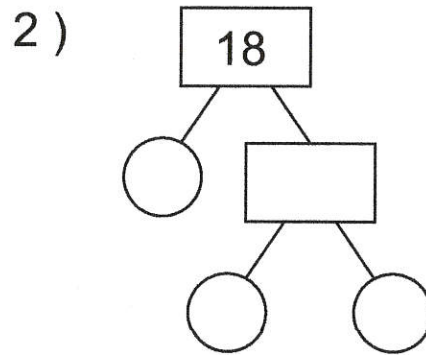
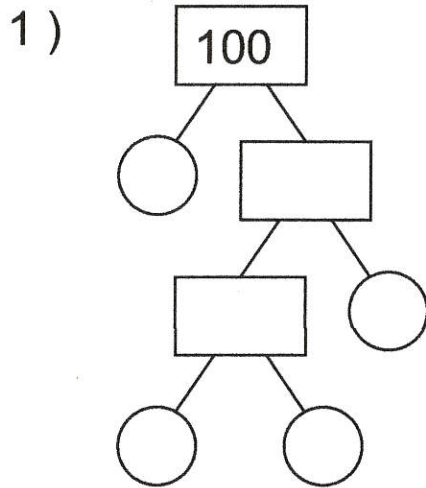
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Teacher : _____

Date : _____

Find the Prime Factors of the Numbers



Prime Factors

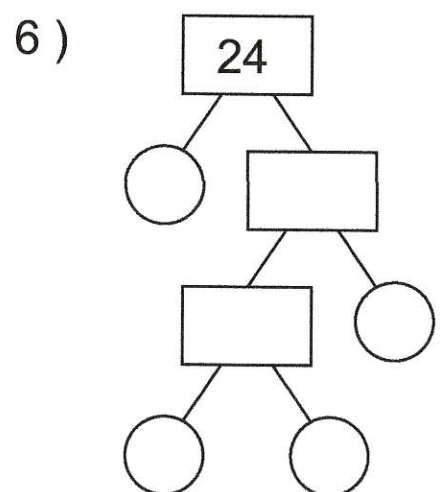
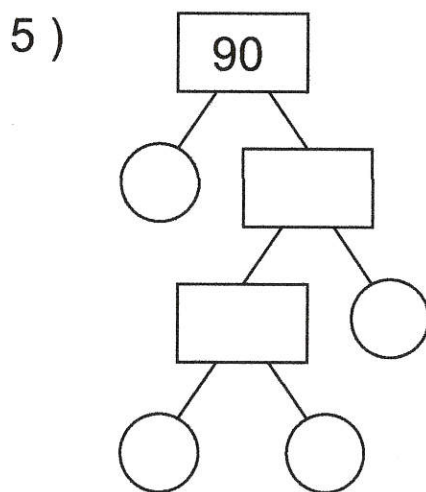
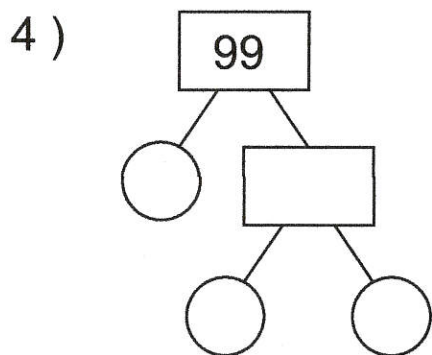
 x x x = 100

Prime Factors

 x x = 18

Prime Factors

 x x x x = 32



Prime Factors

 x x = 99

Prime Factors

 x x x = 90

Prime Factors

 x x x = 24



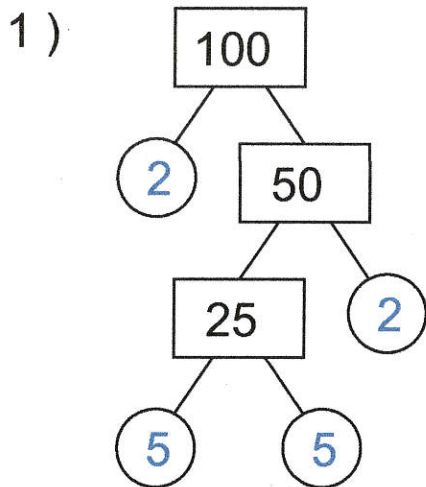
Name : _____

Score : _____

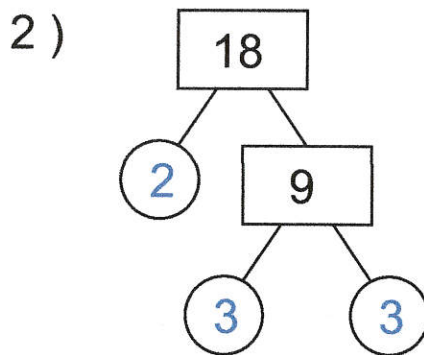
Teacher : _____

Date : _____

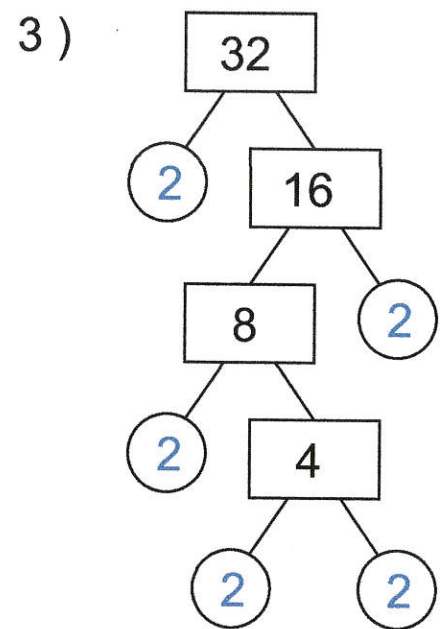
Find the Prime Factors of the Numbers



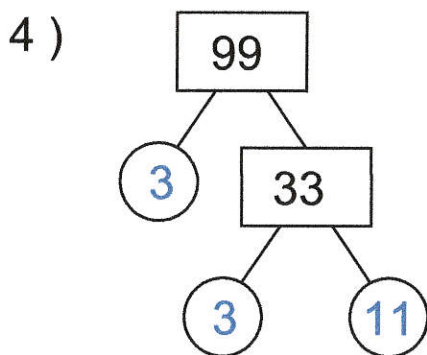
Factors
 $2 \times 2 \times 5 \times 5 = 100$



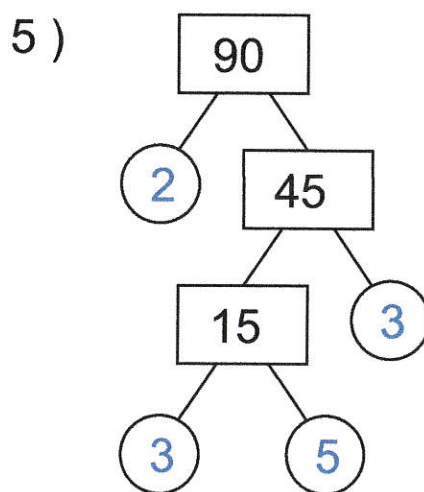
Factors
 $2 \times 3 \times 3 = 18$



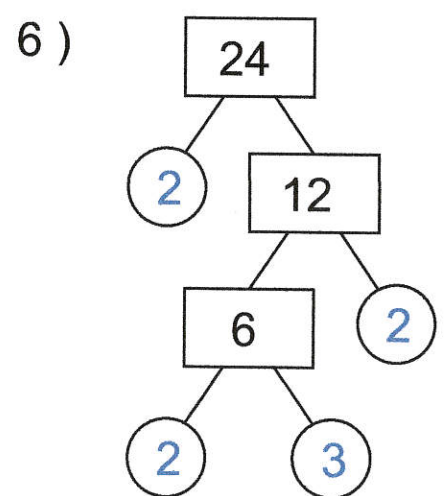
Factors
 $2 \times 2 \times 2 \times 2 \times 2 = 32$



Factors
 $3 \times 3 \times 11 = 99$



Factors
 $2 \times 3 \times 3 \times 5 = 90$



Factors
 $2 \times 2 \times 2 \times 3 = 24$



Properties (Rules) of Real Numbers

1. Commutative Property

The commutative property says that you can change the order of numbers when adding or multiplying. Changing the order of numbers does not change the sum (the answer of an addition problem) or product (the answer of a multiplication problem).

Examples of the **commutative property**:

$$10 + 20 + 25 = 25 + 20 + 10 = 20 + 25 + 10 = 55$$

The answer will be 55 no matter how you line up the numbers.

$$10 \times 5 \times 2 = 2 \times 5 \times 10 = 5 \times 10 \times 2 = 200$$

The answer will be 200 no matter how you line up the numbers.

Prove that the **commutative property** does **not** work with subtraction and division.

2. Associative Property

The associative property says that changing the grouping of numbers when you add and multiply does not change the answer.

Examples of the **associative property**:

$$(10 + 20) + 5 = 10 + (20 + 5) = 35$$

The answer doesn't change when you change the grouping.

$$(5 \times 4) \times 2 = 5 \times (4 \times 2) = 40$$

The answer doesn't change when the numbers are regrouped.

Prove that the **associative property** does **not** work with subtraction and division.

3. Distributive Property

The distributive property is helpful when working with longer strings of numbers that include parentheses. This property shows a different way to work with a number being multiplied by a sum or difference contained in parentheses.

Examples of the **distributive property**:

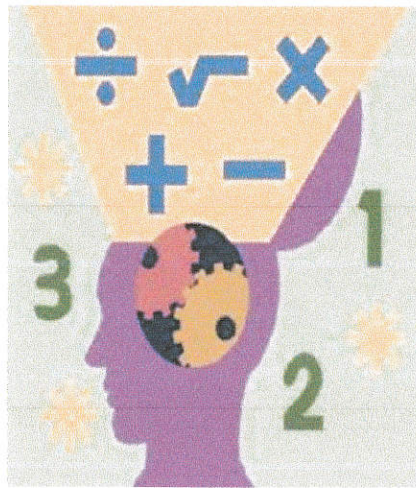
$$5(2 + 4) = 5(2) + 5(4) = 30 \quad \text{or} \quad 4(10 - 5) = 4(10) - 4(5) = 20$$

Practice: Rewrite and solve using the distributive property.

- $10(5 + 8) =$ _____
- $12(8 + 5) =$ _____
- $8(10 - 4) =$ _____
- $n(5 + 4) =$ _____
- $x(n - y) =$ _____

Algebra

The language of math



Algebra spoken here

Different Ways to Write Multiplication

Five multiplied by four can also be written as:

- 5×4
- $5(4)$
- $5 \cdot 4$
- 5 times 4

Two or more letters next to each other also indicate multiplication:

The letters are called **variables** because they can represent any number (the numbers will vary).

- rt means r times t
- $r \times t$ means r times t
- lwh means l times w times l
- $r(t)$ means r times t

Multiplication can also be written with letters and numbers.

- $5n$ means 5 times n
- $5nr$ means 5 times n times r
- $5(n)$ means 5 times n

Practice:

1. $6(4) = \underline{\hspace{2cm}}$
2. $8 \cdot 8 = \underline{\hspace{2cm}}$
3. $5n = \underline{\hspace{2cm}}$ $n = 10$
4. $5n = \underline{\hspace{2cm}}$ $n = 8$
5. $rt = \underline{\hspace{2cm}}$ $r = 6$ and $t = 10$
6. $7x = \underline{\hspace{2cm}}$ $x = 6$
7. $9(n) = \underline{\hspace{2cm}}$ $n = 11$
8. $lwh = \underline{\hspace{2cm}}$ $l = 5, w = 10, h = 8$

Different Ways to Write Division

Ten divided by five can also be written as:

- 10 divided by 5
- $10 \div 5$
- $5 \overline{)10}$
- $\frac{10}{5}$

Practice:

1. Twenty divided by 2 equals _____

2. $40 \div 4 =$ _____

3. $\frac{50}{10} =$ _____

4. $6 \overline{)30} =$ _____

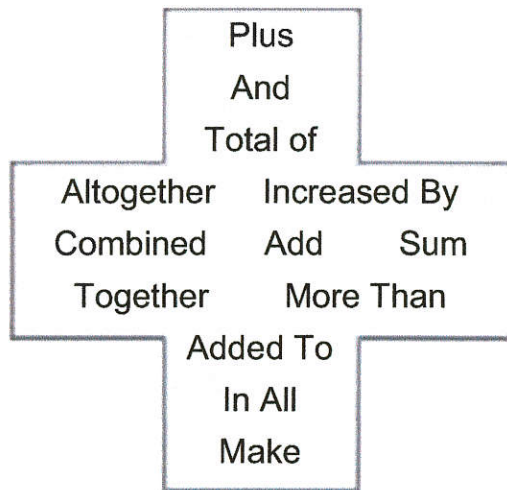
5. $30 \div x =$ _____ $x = 6$

6. $\frac{21}{N} =$ _____ $N = 7$

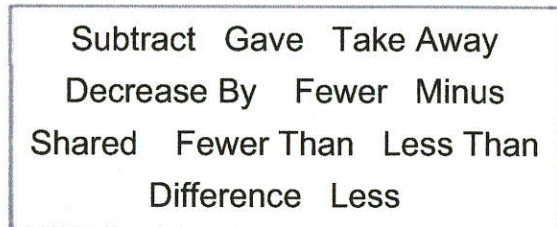
7. $\frac{N}{3} =$ _____ $N = 15$

Words and Phrases to Math Symbols

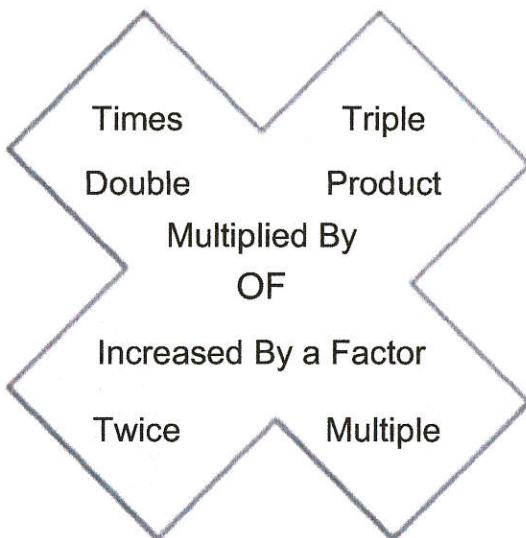
Addition



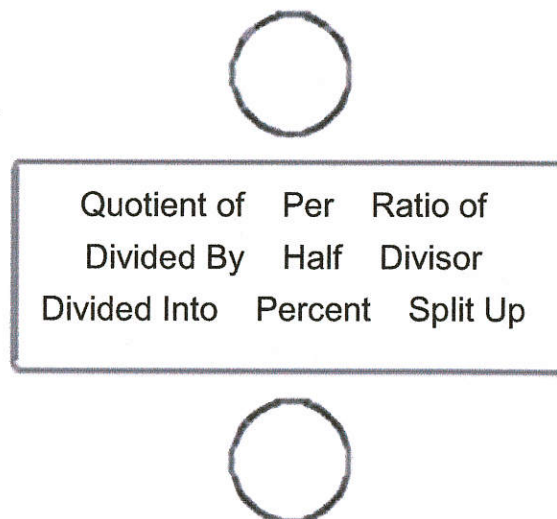
Subtraction



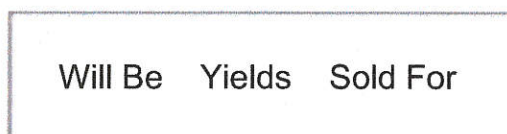
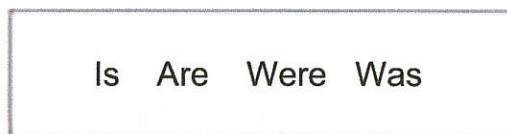
Multiplication



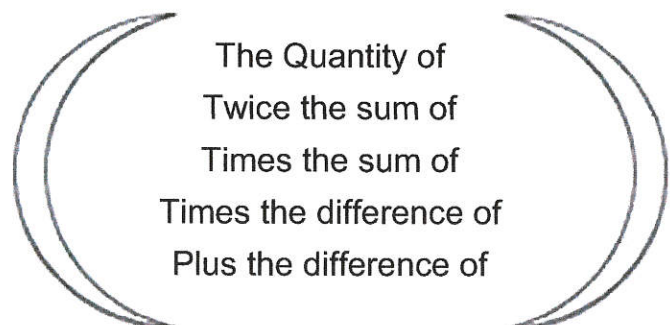
Division



Equals

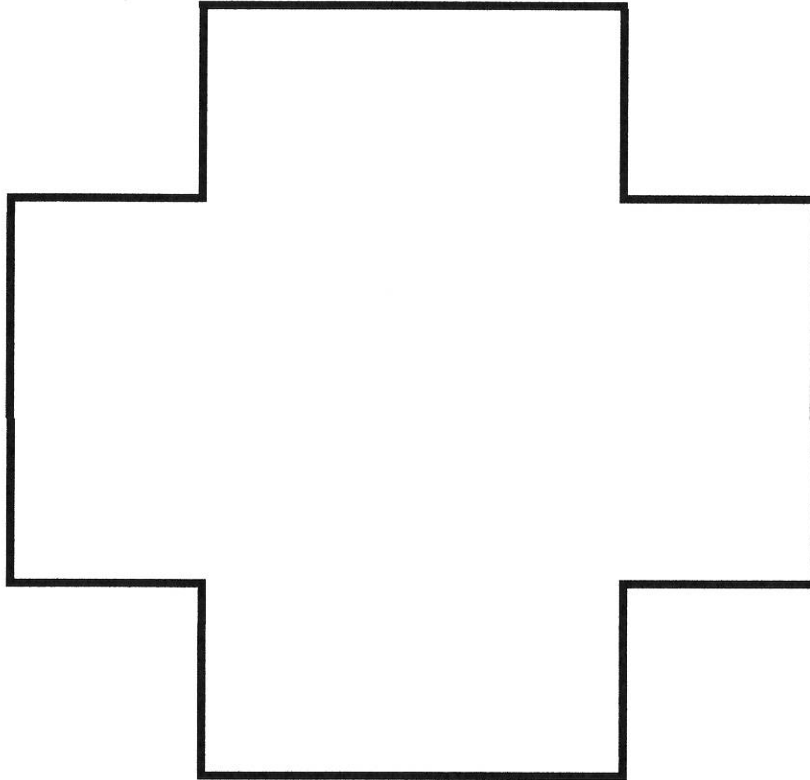


Parenthesis Words

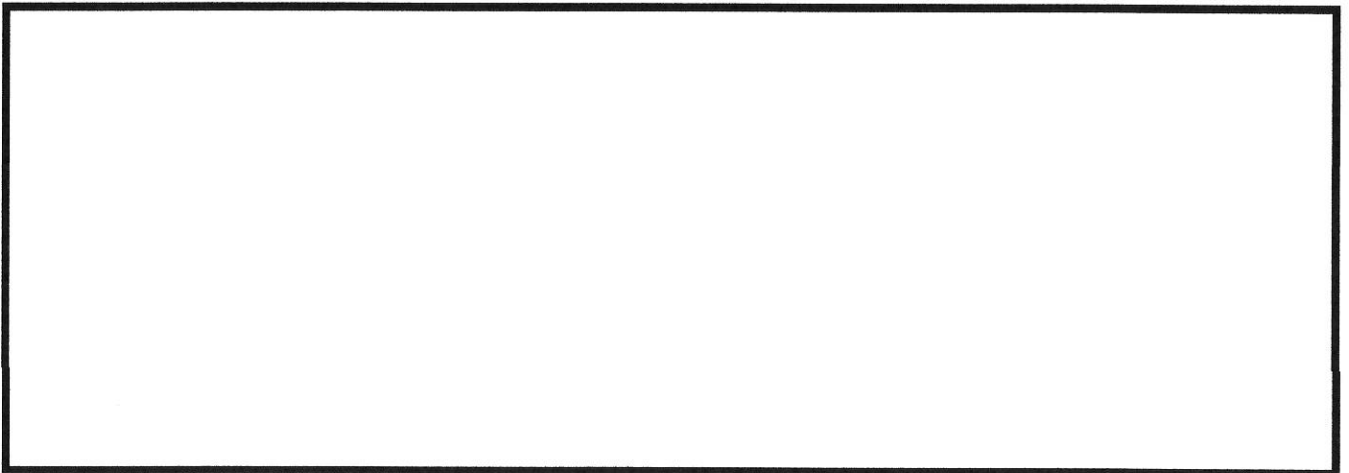


List words that can also mean add and subtract:

ADDITION

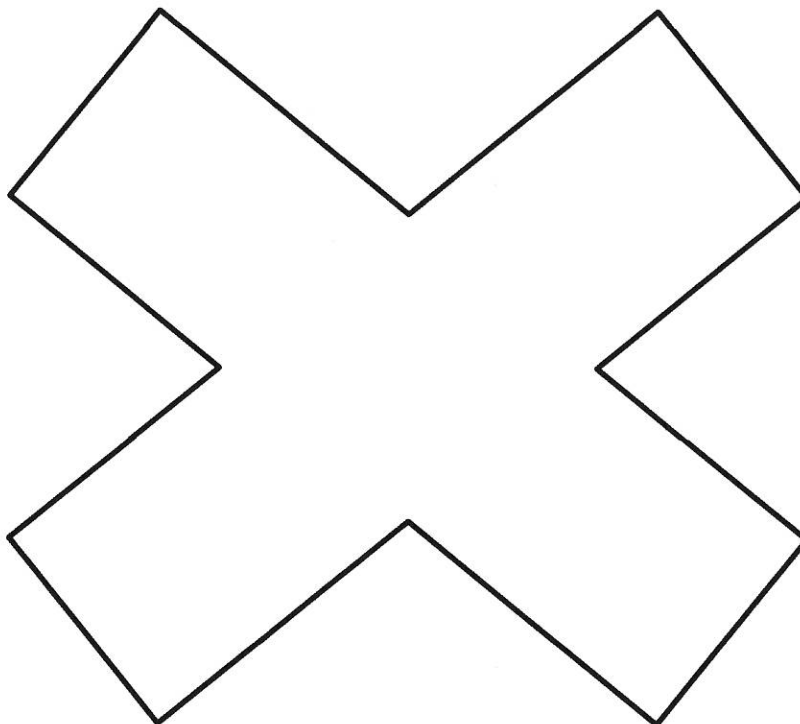


SUBTRACTION

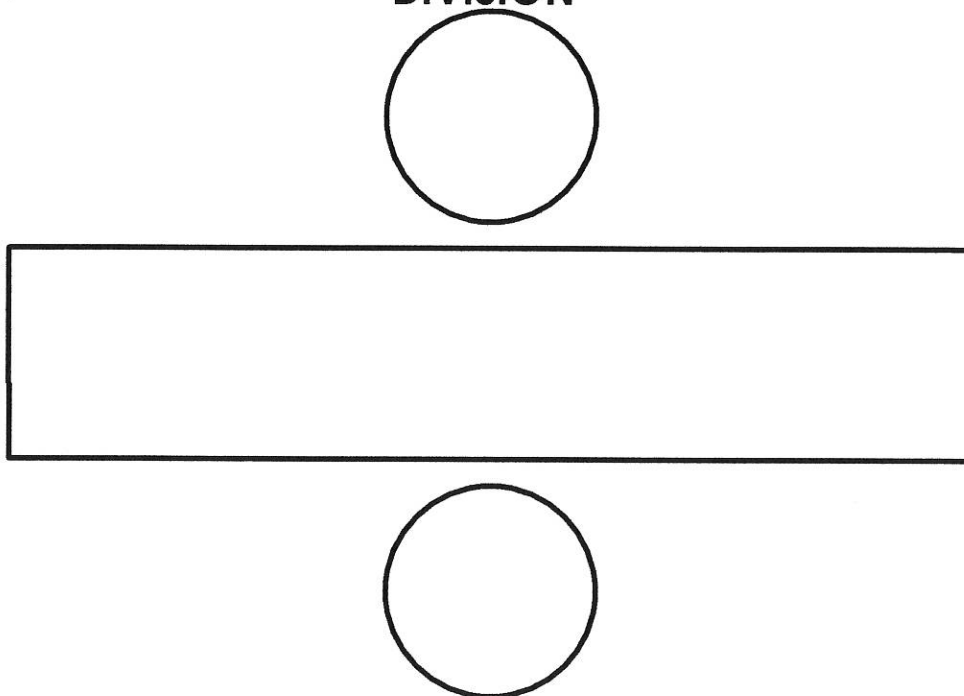


List words that can also mean multiply and divide:

MULTIPLICATION



DIVISION

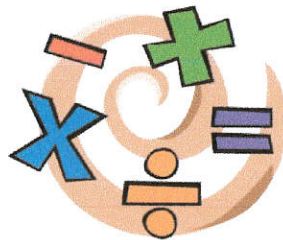


Words and Phrases to Math Symbols

Addition and Subtraction

1. What is the sum of 10 and 20? _____
2. What is 100 decreased by 50? _____
3. What is 100 increased by 50? _____
4. What is the difference between 75 and 25? _____
5. What is 20 less than 100? _____
6. What is 20 and 100 combined? _____
7. What is 50 fewer 75? _____
8. What is the total of 25 and 65? _____
9. What is 20 more than 60? _____
10. What is the difference between 200 and 150? _____

Write 3 questions of your own using addition and subtraction phrases.

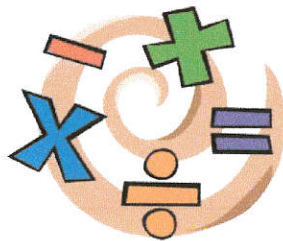


Words and Phrases to Math Symbols

Multiplication and Division

1. What is 5 times 10? _____
2. What is 10 multiplied by 20? _____
3. If you double 10, what do you get? _____
4. What is half of 80? _____
5. What is the quotient of 25 and 5? _____
6. What is 20 split up into 2 equal pieces? _____
7. If you triple 25, what is the product? _____
8. What is 50 split up into 5 equal pieces? _____
9. What is twice 50? _____
10. If pens cost \$8.00 for 4, what is the price **per** pen? _____

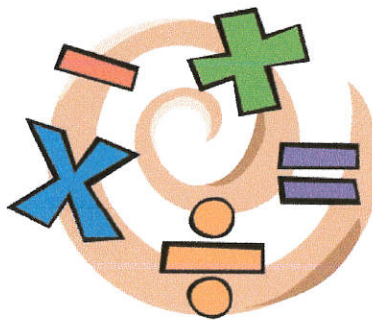
Write 3 problems of your own.



Words and Phrases to Math Symbols

All Mixed Up

1. What is the difference between 100 and 25? _____
2. What is the product of 10 and 5? _____
3. What is the total of 100 and 25? _____
4. What is the quotient of 100 and 50? _____
5. What is 200 increased by 50? _____
6. What 200 decreased by 50? _____
7. What is half of 200? _____
8. What is 100 split into 4 equal pieces? _____
9. Combine 100 and 200. _____
10. What is 30 fewer than 80? _____



Translating Algebraic Phrases (A)

Instructions: Write an algebraic expression for each phrase.

a number decreased by ninety-two

the sum of eighty-nine and a number

a number added to thirty-six

the sum of a number and twenty-six

the difference between forty-six and a number

the sum of a number and forty-three

the quotient of twenty and a number

a number increased by sixty-five

the sum of seventy and a number

a number increased by eighteen

fifty-five times a number

fourteen times a number

a number increased by sixty-five

the sum of fifty-two and a number

seventy-five more than a number

Translating Algebraic Phrases (A) Answers

Instructions: Write an algebraic expression for each phrase.

a number decreased by ninety-two	<u>$n - 92$</u>
the sum of eighty-nine and a number	<u>$89 + n$</u>
a number added to thirty-six	<u>$36 + n$</u>
the sum of a number and twenty-six	<u>$n + 26$</u>
the difference between forty-six and a number	<u>$46 - n$</u>
the sum of a number and forty-three	<u>$n + 43$</u>
the quotient of twenty and a number	<u>$20/n$</u>
a number increased by sixty-five	<u>$n + 65$</u>
the sum of seventy and a number	<u>$70 + n$</u>
a number increased by eighteen	<u>$n + 18$</u>
fifty-five times a number	<u>$55n$</u>
fourteen times a number	<u>$14n$</u>
a number increased by sixty-five	<u>$n + 65$</u>
the sum of fifty-two and a number	<u>$52 + n$</u>
seventy-five more than a number	<u>$n + 75$</u>

Name _____

Date _____

Express each phrase as an algebraic expression.

1. 8 less than 25 multiplied by a number n	2. 7 more than the quotient of 26 and a number n
3. 3 more than the difference of 20 and a number x	4. a number s plus 45
5. Five times the product of a number x and 8	6. 9 more than a number w
7. 4 times the sum of 41 and a number y	8. 5 less than the quotient of a number n and 16
9. 7 less than the difference of 22 and a number n	10. 5 times the sum of a number u and 15
11. 3 plus a number y times 35	12. 3 plus 27 less than a number n
13. 7 times the product of a number c and 7	14. 6 more than the sum of 24 and a number n
15. 8 plus a number s increased by 38	16. 4 more than the quotient of a number x and 12

Name _____

Date _____

Express each phrase as an algebraic expression.

1. 8 less than 25 multiplied by a number n $25n - 8$	2. 7 more than the quotient of 26 and a number n $7 + 26 \div n$
3. 3 more than the difference of 20 and a number x $3 + (20 - x)$	4. a number s plus 45 $s + 45$
5. Five times the product of a number x and 8 $58x$	6. 9 more than a number w $9 + w$
7. 4 times the sum of 41 and a number y $4(41 + y)$	8. 5 less than the quotient of a number n and 16 $n \div 16 - 5$
9. 7 less than the difference of 22 and a number n $(22 - n) - 7$	10. 5 times the sum of a number u and 15 $5(u + 15)$
11. 3 plus a number y times 35 $35(3 + y)$	12. 3 plus 27 less than a number n $3 + (n - 27)$
13. 7 times the product of a number c and 7 $7c7$	14. 6 more than the sum of 24 and a number n $6 + 24 + n$
15. 8 plus a number s increased by 38 $8 + s + 38$	16. 4 more than the quotient of a number x and 12 $4 + x \div 12$

Basic Algebra Vocabulary

In algebra, a **variable** is an unknown quantity. It is often represented by a letter. Circle the variables (or unknown amount) in each of the expressions below.

$6 + x$

$y - 9$

$8z$

$\frac{16}{n}$

A **constant** is a quantity with a value that does not change. It is usually represented by a number. Circle the constants (or numerical amounts) in each of the expressions below.

$4 + n$

$d - 9$

$2 - m$

$5 + a$

An **expression** is a mathematical phrase with constants, variables, and/or operation symbols. Below each expression, tell what operation is used. Write addition, subtraction, division, or multiplication.

$y - 3$

$6m$

$7 + n$

$\frac{20}{n}$

An **equation** is a mathematical statement that uses an equal sign to show that two or more expressions are equal. Tell whether each item below is an equation or expression.

$9 - n = 15$

$\frac{15}{3}$

$2c = 4$

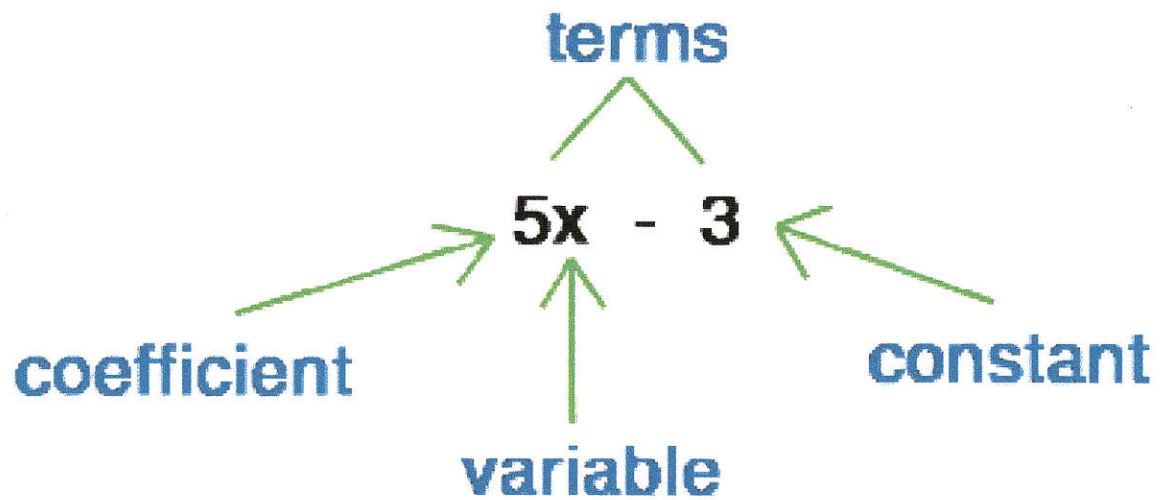
$8 + a$

$10 + 5x = 23 + 7$

Is the mathematical statement shown above an equation or an expression?

How many variables are in this statement? _____ How many constants? _____

Algebraic Expressions



What is an **algebraic expression**?

An **algebraic expression** is a variable or combinations of variables, numbers, and symbols that represents a mathematical relationship. A **variable** is an unknown quantity and is often represented by a letter.

An **algebraic expression** has no equal sign.

Examples of an algebraic expression:

- $n + 3$
- $n - 10$
- $5n$
- $5n + 10$
- $N \div 5$

You can't figure out the value of an expression unless you know the value of the variable.

Complete the following:

I make \$10 an hour where I work. My schedule is all over the place. Some weeks I work 8 hours and some weeks I work 28 hours.

The expression that represents my pay is $10n$ (the n represents the number of hours that I work).

Figure out my pay each week:

- Week one: $n = 12$ hours _____
- Week two: $n = 24$ hour _____
- Week three: $n = 18$ hours _____
- Week four: $n = 8$ hours _____

What expression represents my pay if I earn \$12 per hour? _____

What expression represents my pay if I earn \$9.50 per hour? _____

Write an **algebraic expression** for each situation described below.

1. John worked n hours for \$8.25 per hour _____
2. I drove n hours at 65 miles per hour _____
3. David's weight is 4 times greater than his sister's weight. Write an expression for each of their weights. _____
4. Sean weighs 15 pounds more than Shayne. Write an expression for each of their weights. _____
5. Write an expression for an unknown number of nickels. _____
6. Write the expression for an unknown number of dimes. _____
7. Write an expression for the number of minutes in an unknown number of hours. _____
8. A coffee and donut together cost \$2.75. If the coffee cost n , write an expression for the cost of the donut. _____
9. Faith earns \$10.00 per hour plus a bonus of \$25.00 per week. Write an expression to describe how much Faith earns in one week. _____
10. Write an expression for the number of inches in an unknown number of feet. _____

Write an **algebraic expression** for each situation described below.

Answers

1. John worked n hours for \$8.25 per hour $8.35n$
2. I drove n hours at 65 miles per hour $65n$
3. David's weight is 4 times greater than his sister's weight. Write an expression for each of their weights. David = $4x$, sister = x
4. Sean weighs 15 pounds more than Shayne. Write an expression for each of their weights. Shayne = n , Sean = $n + 15$
5. Write an expression for an unknown number of nickels. $.05n$
6. Write the expression for an unknown number of dimes. $.10n$
7. Write an expression for the number of minutes in an unknown number of hours. $60n$
8. A coffee and donut together cost \$2.75. If the coffee cost n , write an expression for the cost of the donut. $2.75 - n$
9. Faith earns \$10.00 per hour plus a bonus of \$25.00 per week. Write an expression to describe how much Faith earns in one week. $10n + 25$
10. Write an expression for the number of inches in an unknown number of feet. $12n$

Algebraic Expressions

Write the expression and find the value of the expressions below:

1. Cait earns \$9.25 per hour. Expression: _____

How much does Cait earn if she works:

- 10 hours _____
- 20 hours _____
- 15 hours _____
- 12.5 hours _____

2. Pat drives a lot for work. She drives a different number of miles each week and averages about 40mph. Write an expression that describes the number of miles Pat drives in a week. _____

How many miles does Pat drive if she drives:

- 20 hours _____
- 15 hours _____
- 18 hours _____
- 22 hours _____

3. Write an expression for the number of minutes in an hour. _____

How many minutes are there in:

- 5 hours _____
- 10 hours _____
- 15 hours _____
- 2.5 hours _____

4. Write an expression to describe how much Faith earns in a week if she is paid \$10.00 per hour and gets a \$25.00 bonus each week for outstanding work. _____

How much does Faith earn if she works:

- 20 hours per week _____
- 15 hours per week _____
- 25 hours per week _____
- 30 hours per week _____

Algebraic Expressions

Answers

Write the expression and find the value of the expressions below:

1. Cait earns \$9.25 per hour. Expression: 9.25n

How much does Cait earn if she works:

- 10 hours _____
- 20 hours _____
- 15 hours _____
- 12.5 hours _____

2. Pat drives a lot for work. She drives a different number of miles each week and averages about 40mph. Write an expression that describes the number of miles Pat drives in a week. 40n

How many miles does Pat drive if she drives:

- 20 hours _____
- 15 hours _____
- 18 hours _____
- 22 hours _____

3. Write an expression for the number of minutes in an hour. 60n

How many minutes are there in:

- 5 hours _____
- 10 hours _____
- 15 hours _____
- 2.5 hours _____

4. Write an expression to describe how much Faith earns in a week if she is paid \$10.00 per hour and gets a \$25.00 bonus each week for outstanding work. 10n + 25

How much does Faith earn if she works:

- 20 hours per week _____
- 15 hours per week _____
- 25 hours per week _____
- 30 hours per week _____

Evaluating Expressions (A)

Evaluate each expression using the value given.

1. $7 - b$
($b = 6$)

6. $7 \div b$
($b = 4$)

11. $x - 8$
($x = 10$)

2. $x + 7$
($x = 7$)

7. $1 + v$
($v = 10$)

12. $5 + x$
($x = 8$)

3. $2b$
($b = 2$)

8. $y + 6$
($y = 8$)

13. $z \cdot z$
($z = 3$)

4. $y - y$
($y = 6$)

9. $u \div 10$
($u = 1$)

14. $z - z$
($z = 5$)

5. $5b$
($b = 5$)

10. $2u$
($u = 10$)

15. $c - c$
($c = 4$)

Evaluating Expressions (A) Answers

Evaluate each expression using the value given.

$$\begin{aligned} 1. \quad & 7 - b \\ & (b = 6) \\ & = 1 \end{aligned}$$

$$\begin{aligned} 6. \quad & 7 \div b \\ & (b = 4) \\ & = \frac{7}{4} \end{aligned}$$

$$\begin{aligned} 11. \quad & x - 8 \\ & (x = 10) \\ & = 2 \end{aligned}$$

$$\begin{aligned} 2. \quad & x + 7 \\ & (x = 7) \\ & = 14 \end{aligned}$$

$$\begin{aligned} 7. \quad & 1 + v \\ & (v = 10) \\ & = 11 \end{aligned}$$

$$\begin{aligned} 12. \quad & 5 + x \\ & (x = 8) \\ & = 13 \end{aligned}$$

$$\begin{aligned} 3. \quad & 2b \\ & (b = 2) \\ & = 4 \end{aligned}$$

$$\begin{aligned} 8. \quad & y + 6 \\ & (y = 8) \\ & = 14 \end{aligned}$$

$$\begin{aligned} 13. \quad & z \cdot z \\ & (z = 3) \\ & = 9 \end{aligned}$$

$$\begin{aligned} 4. \quad & y - y \\ & (y = 6) \\ & = 0 \end{aligned}$$

$$\begin{aligned} 9. \quad & u \div 10 \\ & (u = 1) \\ & = \frac{1}{10} \end{aligned}$$

$$\begin{aligned} 14. \quad & z - z \\ & (z = 5) \\ & = 0 \end{aligned}$$

$$\begin{aligned} 5. \quad & 5b \\ & (b = 5) \\ & = 25 \end{aligned}$$

$$\begin{aligned} 10. \quad & 2u \\ & (u = 10) \\ & = 20 \end{aligned}$$

$$\begin{aligned} 15. \quad & c - c \\ & (c = 4) \\ & = 0 \end{aligned}$$

Name _____

Date _____

Evaluate Expressions

Complete by evaluating each expression. *Be sure to follow the order of operations.*

1. $7m - 3$ for $m = 3$	2. $2n$ for $n = 5$	3. $4r - 4$ for $r = 2$
4. $3x$ for $x = 8$	5. $8d + 21$ for $d = 6$	6. $9w + 27$ for $w = 4$
7. $q \div 4$ for $q = 8$	8. $6t$ for $t = 3$	9. $5h$ for $h = 6$
10. $7k - 52$ for $k = 9$	11. $5a + 42$ for $a = 7$	12. $2u + 17$ for $u = 5$
13. $3b - 2$ for $b = 8$	14. $4c - 10$ for $c = 4$	15. $9y + 41$ for $y = 5$
16. $8v$ for $v = 6$	17. $6s$ for $s = 8$	18. $\frac{p}{9} - 2$ for $p = 27$
19. $3e - 23$ for $e = 9$	20. $6f + 6$ for $f = 2$	21. $s \div 2$ for $s = 12$
22. $4z + 43$ for $z = 6$	23. $2g - 3$ for $g = 4$	24. $7h$ for $h = 2$

Name ANSWERS

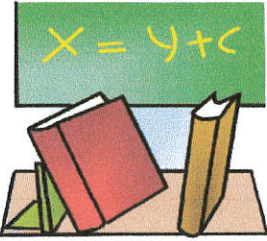
Date _____

Evaluate ExpressionsComplete by evaluating each expression. *Be sure to follow the order of operations.*

1. $7m - 3$ for $m = 3$ 18	2. $2n$ for $n = 5$ 10	3. $4r - 4$ for $r = 2$ 4
4. $3x$ for $x = 8$ 24	5. $8d + 21$ for $d = 6$ 69	6. $9w + 27$ for $w = 4$ 63
7. $q \div 4$ for $q = 8$ 2	8. $6t$ for $t = 3$ 18	9. $5h$ for $h = 6$ 30
10. $7k - 52$ for $k = 9$ 11	11. $5a + 42$ for $a = 7$ 77	12. $2u + 17$ for $u = 5$ 27
13. $3b - 2$ for $b = 8$ 22	14. $4c - 10$ for $c = 4$ 6	15. $9y + 41$ for $y = 5$ 86
16. $8v$ for $v = 6$ 48	17. $6s$ for $s = 8$ 48	18. $\frac{p}{9} - 2$ for $p = 27$ 1
19. $3e - 23$ for $e = 9$ 4	20. $6f + 6$ for $f = 2$ 18	21. $s \div 2$ for $s = 12$ 6
22. $4z + 43$ for $z = 6$ 67	23. $2g - 3$ for $g = 4$ 5	24. $7h$ for $h = 2$ 14

Name: _____

Basic Algebra



Evaluate each expression.

$$a = 3, \quad b = 5, \quad c = 6$$

1. $a + 5$ _____

2. $15 - c$ _____

3. $4b$ _____

4. $\frac{18}{c}$ _____

5. $20 - a$ _____

6. $11b$ _____

7. $\frac{45}{b}$ _____

8. $a - 2$ _____

9. $a + b + c$ _____

10. $\frac{c}{a}$ _____

$$p = 12, \quad q = 2, \quad r = 30$$

11. $q50$ _____

12. $\frac{r}{q}$ _____

13. $p + 4 + 6$ _____

14. $p - 7$ _____

15. $10r$ _____

16. $\frac{r}{10}$ _____

17. $\frac{p}{4}$ _____

18. $r - p$ _____

19. $r - q$ _____

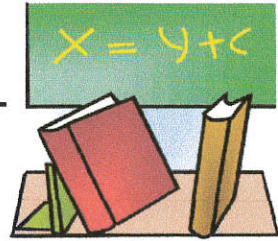
20. $\frac{48}{p}$ _____

Now try this:

Write five of your own algebraic expressions on the back of this paper. Have a friend solve them.

ANSWER KEY

Basic Algebra



Evaluate each expression.

$$a = 3, \quad b = 5, \quad c = 6$$

1. $a + 5$ 8

2. $15 - c$ 9

3. $4b$ 20

4. $\frac{18}{c}$ 3

5. $20 - a$ 17

6. $11b$ 55

7. $\frac{45}{b}$ 9

8. $a - 2$ 1

9. $a + b + c$ 14

10. $\frac{c}{a}$ 2

$$p = 12, \quad q = 2, \quad r = 30$$

11. $q50$ 100

12. $\frac{r}{q}$ 15

13. $p + 4 + 6$ 22

14. $p - 7$ 5

15. $10r$ 300

16. $\frac{r}{10}$ 3

17. $\frac{p}{4}$ 3

18. $r - p$ 18

19. $r - q$ 28

20. $\frac{48}{p}$ 4

Now try this:

Write five of your own algebraic expressions on the back of this paper. Have a friend solve them.

WRITING ALGEBRAIC EXPRESSIONS

From:
Active Mathematics
Ruth Estabrook

Teacher-Centered

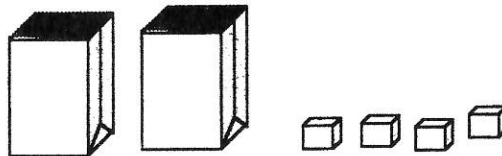
nhadulted.org

Algebraic expressions are often taught in the abstract, and some students have difficulty grasping abstract concepts, especially if they are afraid of math to begin with. A typical way of introducing algebraic expressions is by writing a few examples on the board and then passing out a worksheet for practice. This can be met with a high rate of failure and lack of understanding.

Student-Centered

An alternative approach to teaching the concept of algebraic expressions is through the use of paper bags or paper cups. This makes the lesson visual and hands-on, and it involves a degree of critical thinking. (The following activity is based on a lesson in Impact Mathematics published by Everyday Learning, 2000.)

1. Tell the students that each bag contains the same number of blocks, but you don't know how many, so they can call it x . If they have two bags containing the same number of blocks, plus 4 additional blocks, how many blocks would they have? This can be written as $2x + 4$. Then when you tell them how many are in each bag, they can evaluate their expression.



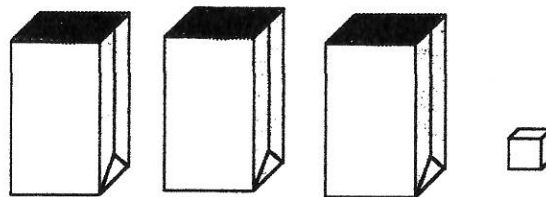
2. After this brief discussion, have your students work in groups of two or three to discuss and answer the following questions.
 - a) Suppose you had three bags, each containing the same number of blocks, plus two extra blocks. Write an algebraic expression for this situation. Use n for the number of blocks in each bag.
 - b) If $x = 2$, what is the total number of blocks?
 - c) If $x = 0$, what is the total number of blocks?

d) If $x = 25$, what is the total number of blocks?

3. Complete this table.

x	10	5	40	25	100	?	?	22	?
$3x + 2$?	17	?	77	?	23	92	?	3143

4. Could the total number of blocks in this situation be 18? Explain.
5. To represent this situation with the expression $3x + 2$, you need to assume all the bags contain the same number of blocks. Why?
6. Now suppose you have 5 bags and 4 extra blocks.
 - a) What is the total number of blocks if each bag contains 3 blocks? If each bag contains 10 blocks?
 - b) Using n to represent the total number of blocks in each bag, write an algebraic expression for the total number of blocks.
 - c) Find the value of your expression for $x = 3$ and $x = 10$. Do you get the same answers you found in part a?
3. Write an expression to represent 7 bags each with the same number of blocks, plus 5 extra blocks.
4. Rebecca wrote the expression $3b + 1$ to describe the total number of blocks represented in this picture.



- a) What does the variable b stand for in her expression?
- b) What does the 3 stand for?
- c) What does the 1 stand for?

I HAVE... WHO HAS

I have $2k$.

Who has 6 times a number?

I have $6y$.

Who has 5 times a number?

I have $5x$.

Who has 8 more than a number?

I have $t+8$.

Who has 10 less than a number?

I have $y-10$.

Who has 12 times a number?

I have $12t$.

Who has 20 less than a number?

I have $x-20$.

Who has 12 more than a number?

I have $k+12$.

Who has 20 more than a number?

I have $n+20$.

Who has 9 times a number?

I have $9y$.

Who has 2 more than a number?

I have $4t$.

Who has 6 more than a number?

I have $k+6$.

Who has 5 more than a number?

I have $x+5$.

Who has 2 less than a number?

I have $c-2$

Who has 7 less than a number?

I have $y-7$.

Who has 8 times a number?

I have $8k$.

Who has 9 less than a number?

I have $t-9$.

Who has 1 less than a number?

I have $n-1$.

Who has 4 less than a number?

I have $y-4$.

Who has 7 more than a number?

I have $g+7$.

Who has 2 times a number?

I have $n+2$.

Who has four more than a number?

I have $x+4$.

Who has 3 times a number?

I have $3n$.

Who has 7 times a number?

I have $7x$.

Who has 5 less than a number?

I have $y-5$.

Who has one more than a number?

I have $n+1$.

Who has 10 times a number?

I have $10y$.

Who has 6 less than a number?

I have $n-6$.

Who has 10 more than a number?

I have $x+10$.

Who has 9 more than a number?

I have $n+9$.

Who has 4 times a number?

Solving Equations



Solving Equations

An **equation** is a mathematical statement that uses an equal sign to show that two or more expressions are equal.

Examples of an equation:

- $n + 5 = 25$
- $2n + 5 = 45$
- $8n = 80$
- $5n - 2n = 30$

To solve an equation, get the unknown by itself on one side of the equation. Always remember.....what you do to one side of an equation you must do to the other side.



To solve one-step equations, use the inverse of the operation to isolate the unknown. Get the n on one side by itself.

- $n + 37 = 82$ What does n equal?
 $n + 37 - 37 = 82 - 37$
 $n = 45$
- Always be sure to check your answer. Does $45 + 37 = 82$? Yes!

The inverse of addition is _____ . The inverse of subtraction is _____ . The inverse of multiplication is _____ . The inverse of division is _____ .

Name _____

Solving Addition Equations

Try to solve as many of the following equations in your head as you can.

$X + 25 = 100$ What number plus 25 equals 100? $75 + 25 = 100$ so $X = 75$

To solve the equations you can also use the opposite operation on both sides, this balances the equation and gives you the answer.

$X + 25 = 100$ $X + 25 - 25 = 100 - 25$ $100 - 25 = 75$ so $X = 75$

Always fit your answer back in to check. $75 + 25 = 100$ so 75 is the correct answer.

Solve each equation.

1. $m + 60 = 110$	2. $c + 30 = 130$	3. $81 = 11 + b$
4. $x + 27 = 48$	5. $n + 15 = 100$	6. $n + 22 = 75$
7. $g + 44 = 97$	8. $N + 33 = 233$	9. $t + 67 = 160$
10. $110 = x + 35$	11. $78 = x + 2$	12. $h + 59 = 110$
13. $87 = w + 54$	14. $58 = f + 32$	15. $35 + q = 98$
16. $n + 100 = 198$	17. $z + 96 = 154$	18. $n + 4 = 49$
19. $112 = x + 50$	20. $28 = 22 + x$	21. $r + 21 = 32$

Check your answers.

Name _____

Solving Subtraction Equations

Try to solve as many of the following equations in your head as you can.

$X - 25 = 15$ What number take away 25 equals 15? $40 - 25 = 15$ so $X = 40$

To solve the equations you can also use the opposite operation on both sides, this balances the equation and gives you the answer.

$X - 25 = 15$ $X - 25 + 25 = 15 + 25$ $15 + 25 = 40$ so $X = 40$

Always fit your answer back in to check. $40 - 25 = 15$ so 15 is the correct answer.

Solve each equation.

1. $m - 10 = 60$	2. $c - 30 = 20$	3. $x - 25 = 75$
4. $x - 27 = 17$	5. $n - 15 = 65$	6. $n - 22 = 11$
7. $g - 4 = 42$	8. $n - 33 = 22$	9. $t - 27 = 12$
10. $X - 25 = 125$	11. $18 = x - 20$	12. $h - 50 = 110$
13. $8 = w - 40$	14. $8 = f - 32$	15. $n - 75 = 5$
16. $n - 15 = 15$	17. $z - 28 = 160$	18. $n - 4 = 500$
19. $112 = x - 50$	20. $28 = x - 22$	21. $r - 21 = 32$

Check your answers.

Solving Multiplication Equations

Try to solve as many of the following equations in your head as you can.

$n \times 5 = 30$ What number times 5 equals 30? $6 \times 5 = 25$ so $n = 6$

To solve the equations you can also use the opposite (inverse) operation on both sides, this balances the equation and gives you the answer.

$n \times 5 = 30$ $n \times 5 \div 5 = 30 \div 5$ $30 \div 5 = 6$ so $n = 6$

Always fit your answer back in to check. $6 \times 5 = 30$ so 6 is the correct answer.

Solve each equation.

1. $5 \times n = 20$	2. $8 \times m = 56$	3. $3 \times n = 15$
4. $9c = 54$	5. $9n = 36$	6. $6k = 24$
7. $32 = 4t$	8. $25 \times b = 100$	9. $18 = 9j$
10. $3d = 12$	11. $(5)n = 45$	12. $(7)n = 42$
13. $6 \times n = 72$	14. $7n = 56$	15. $3h = 21$
16. $66 = 2a$	17. $5n = 150$	18. $3u = 96$
19. $4x = 88$	20. $81 = 9s$	21. $86 = 2w$
22. $3 \times v = 96$	23. $(4)n = 168$	24. $5 \times n = 100$

Check your answers!

Solving Division Equations

Try to solve as many of the following equations in your head as you can.

$n \div 2 = 6$ What number divided by 2 equals 6? $12 \div 2 = 6$ so $n = 12$

To solve the equations you can also use the opposite (inverse) operation on both sides, this balances the equation and gives you the answer.

$n \div 2 = 6$ $n \div 2 \times 2 = 6 \times 2$ so $n = 12$

Always fit your answer back in to check. $12 \div 2 = 6$ so 12 is the correct answer.

Solve each equation.

1. $n \div 5 = 4$	2. $x \div 3 = 7$	3. $\frac{n}{5} = 4$
4. $n \div 9 = 3$	5. $\frac{n}{9} = 7$	6. $\frac{k}{4} = 11$
7. $3 = n \div 4$	8. $\frac{45}{n} = 9$	9. $\frac{18}{y} = 9$
10. $x \div 6 = 6$	11. $\frac{n}{8} = 4$	12. $n \div 7 = 7$
13. $n \div 6 = 3$	14. $\frac{n}{3} = 6$	15. $n \div 3 = 7$
16. $66 = x \div 2$	17. $n \div 5 = 15$	18. $\frac{x}{3} = 13$
19. $x \div 2 = 44$	20. $8 = \frac{16}{x}$	21. $n \div 8 = 2$
22. $x \div 3 = 24$	23. $\frac{n}{2} = 168$	24. $n \div 5 = 100$

Check your answers !

Cut along the lines and have students match the equations.

10 more than a number is 50	$n + 10 = 50$
10 less than a number is 50	$n - 10 = 50$
Twice a number is 50	$2n = 50$
50 divided by a number 10	$\frac{50}{n} = 10$
a number divided by 50 is 10	$\frac{n}{50} = 10$
a number increased by 50 is 10	$n + 50 = 10$
A number decreased by 50 is 10	$n - 50 = 10$
5 times a number is 50	$5n = 50$
half a number is 50	$\frac{n}{2} = 50$
the difference between 50 and a number is 10	$50 - n = 10$

Name _____

Date _____

Writing and Solving Equations

Write an equation for each problem. Then solve the equation.

1. 132 divided by a number is 11.	2. 23 plus a number is 65.
3. A number minus 61 is 28.	4. A number divided by 4 is 3.
5. The difference between 52 and a number is 3.	6. Nine times a number is 54.
7. A number multiplied by 3 is 21.	8. A number plus 76 is 172.
9. 70 divided by a number is 10.	10. A number minus 33 is 46.
11. Six times a number is 12.	12. A number multiplied by 10 is 80.
13. A number plus 40 is 96.	14. 69 plus a number is 152.
15. A number divided by 11 is 4.	16. The difference between 85 and a number is 82.
17. 25 divided by a number is 5.	18. Twelve times a number is 96.

Adapted from edhelper.com

ANSWERS

Name _____

Date _____

Writing and Solving Equations

Write an equation for each problem. Then solve the equation.

1. 132 divided by a number is 11. $\frac{132}{n} = 11 \quad n = 12$	2. 23 plus a number is 65. $23 + n = 65 \quad n = 42$
3. A number minus 61 is 28. $n - 61 = 28 \quad n = 89$	4. A number divided by 4 is 3. $\frac{n}{4} = 3 \quad n = 12$
5. The difference between 52 and a number is 3. $52 - n = 3 \quad n = 49$	6. Nine times a number is 54. $9n = 54 \quad n = 6$
7. A number multiplied by 3 is 21. $3n = 21 \quad n = 7$	8. A number plus 76 is 172. $n + 76 = 172 \quad n = 96$
9. 70 divided by a number is 10. $\frac{70}{n} = 10 \quad n = 7$	10. A number minus 33 is 46. $n - 33 = 46 \quad n = 79$
11. Six times a number is 12. $6n = 12 \quad n = 2$	12. A number multiplied by 10 is 80. $10n = 80 \quad n = 8$
13. A number plus 40 is 96. $n + 40 = 96 \quad n = 56$	14. 69 plus a number is 152. $69 + n = 152 \quad n = 83$
15. A number divided by 11 is 4. $\frac{n}{11} = 4 \quad n = 44$	16. The difference between 85 and a number is 82. $85 - n = 82 \quad n = 3$
17. 25 divided by a number is 5. $\frac{25}{n} = 5 \quad n = 5$	18. Twelve times a number is 96. $12n = 96 \quad n = 8$

Adapted from edhelper.com

Name: _____

Basic Algebra with 2 Variables

1.

$$a + 5 = b$$

If a equals 2, b will equal _____.

If a equals 4, b will equal _____.

If a equals 7, b will equal _____.

2.

$$c - 6 = d$$

If c equals 10, d will equal _____.

If c equals 14, d will equal _____.

If c equals 21, d will equal _____.

3.

$$7e = f$$

If e equals 3, f will equal _____.

If e equals 6, f will equal _____.

If e equals 12, f will equal _____.

4.

$$\frac{12}{g} = h$$

If g equals 3, h will equal _____.

If g equals 4, h will equal _____.

If g equals 2, h will equal _____.

5.

$$j + 5 = k$$

j	k
3	
	5
9	
	13

6.

$$6m = n$$

m	n
3	
	30
0	
	54

7.

$$\frac{p}{3} = q$$

p	q
9	
	11
36	
	7

8.

$$13 - r = s$$

r	s
7	
	5
9	
	1

ANSWER KEY

Basic Algebra with 2 Variables

1.

$$a + 5 = b$$

If a equals 2, b will equal 7

If a equals 4, b will equal 9

If a equals 7, b will equal 12

2.

$$c - 6 = d$$

If c equals 10, d will equal 4

If c equals 14, d will equal 8

If c equals 21, d will equal 15

3.

$$7e = f$$

If e equals 3, f will equal 21

If e equals 6, f will equal 42

If e equals 12, f will equal 84

4.

$$\frac{12}{g} = h$$

If g equals 3, h will equal 4

If g equals 4, h will equal 3

If g equals 2, h will equal 6

5.

$$j + 5 = k$$

	j	k	
	3	8	8
0	0	5	
	9	14	14
8	8	13	

6.

$$6m = n$$

	m	n
	3	18
	5	30
	0	0
	9	54

7.

$$\frac{p}{3} = q$$

	p	q	
	9	3	3
33	33	11	
	36	12	12
	21	7	

8.

$$13 - r = s$$

	r	s
	7	6
	8	5
	9	4
	12	1

Linear Equations $ax + b = c$ (A)

Instructions: Solve each equation for the variable given.

$$8r + 17 = 65$$

$$5d + 19 = 79$$

$$7h + 15 = 141$$

$$4w + 10 = 58$$

$$9n + 17 = 116$$

$$2r + 4 = 30$$

$$9r + 13 = 184$$

$$3n + 20 = 47$$

$$9c + 20 = 182$$

$$7g + 5 = 33$$

$$2m + 4 = 24$$

$$5a + 8 = 43$$

$$5k + 12 = 22$$

$$9w + 3 = 57$$

$$2u + 12 = 16$$

$$5j + 7 = 72$$

$$5j + 11 = 61$$

$$9x + 5 = 77$$

Linear Equations $ax + b = c$ (A) Answers

Instructions: Solve each equation for the variable given.

$$\begin{aligned}8r + 17 &= 65 \\8r &= 48 \\r &= 6\end{aligned}$$

$$\begin{aligned}5d + 19 &= 79 \\5d &= 60 \\d &= 12\end{aligned}$$

$$\begin{aligned}7h + 15 &= 141 \\7h &= 126 \\h &= 18\end{aligned}$$

$$\begin{aligned}4w + 10 &= 58 \\4w &= 48 \\w &= 12\end{aligned}$$

$$\begin{aligned}9n + 17 &= 116 \\9n &= 99 \\n &= 11\end{aligned}$$

$$\begin{aligned}2r + 4 &= 30 \\2r &= 26 \\r &= 13\end{aligned}$$

$$\begin{aligned}9r + 13 &= 184 \\9r &= 171 \\r &= 19\end{aligned}$$

$$\begin{aligned}3n + 20 &= 47 \\3n &= 27 \\n &= 9\end{aligned}$$

$$\begin{aligned}9c + 20 &= 182 \\9c &= 162 \\c &= 18\end{aligned}$$

$$\begin{aligned}7g + 5 &= 33 \\7g &= 28 \\g &= 4\end{aligned}$$

$$\begin{aligned}2m + 4 &= 24 \\2m &= 20 \\m &= 10\end{aligned}$$

$$\begin{aligned}5a + 8 &= 43 \\5a &= 35 \\a &= 7\end{aligned}$$

$$\begin{aligned}5k + 12 &= 22 \\5k &= 10 \\k &= 2\end{aligned}$$

$$\begin{aligned}9w + 3 &= 57 \\9w &= 54 \\w &= 6\end{aligned}$$

$$\begin{aligned}2u + 12 &= 16 \\2u &= 4 \\u &= 2\end{aligned}$$

$$\begin{aligned}5j + 7 &= 72 \\5j &= 65 \\j &= 13\end{aligned}$$

$$\begin{aligned}5j + 11 &= 61 \\5j &= 50 \\j &= 10\end{aligned}$$

$$\begin{aligned}9x + 5 &= 77 \\9x &= 72 \\x &= 8\end{aligned}$$

Use Algebra to Solve Problems

1. Caitlyn is 5 years older than Shayne. If the total of their ages is 25, how old is Shayne? _____ How old is Caitlyn? _____
2. John is 8 years older than Nicole. If the total of their ages is 32, how old is Nicole? _____ How old is John? _____
3. Sean weighs 16 pounds more than his sister Denise. If their total weight is 300 pounds, how much does Denise weigh? _____ How much does Sean weigh? _____
4. Lou weighs 18 pounds more than Andy. If their weight totals 144 pounds, how much does Andy weigh? _____ How much does Lou weigh? _____
5. David weighs twice as much John and the total of their weight is 291 pounds. How much does John weigh? _____ How much does David weigh? _____
6. Benny weighs 3 times as much as his son Benny Jr. If their combined weight is 320 pounds, how much does Benny Jr. weigh? _____ How much does Benny weigh? _____

Use Algebra to Solve Problems

1. Caitlyn is 5 years older than Shayne. If the total of their ages is 25, how old is Shayne? 10 How old is Caitlyn? 15

$$\begin{aligned} \text{Shayne} &= x & x + x + 5 &= 25 \\ \text{Cait} &= x + 5 & 2x + 5 &= 25 & 2x &= 20 & x &= 10 \end{aligned}$$

2. John is 8 years older than Nicole. If the total of their ages is 32, how old is Nicole? 12 How old is John? 20

$$\begin{aligned} \text{Nicole} &= x & x + x + 8 &= 32 \\ \text{John} &= x + 8 & 2x + 8 &= 32 & 2x &= 24 & x &= 12 \end{aligned}$$

3. Sean weighs 16 pounds more than his sister Denise. If their total weight is 300 pounds, how much does Denise weigh? 142
How much does Sean weigh? 158

$$\begin{aligned} \text{Sean} &= x + 16 & x + x + 16 &= 300 \\ \text{Denise} &= x & 2x + 16 &= 300 & 2x &= 284 & x &= 142 \end{aligned}$$

4. Lou weighs 18 pounds more than Andy. If their weight totals 144 pounds, how much does Andy weigh? 63 How much does Lou weigh? 71

$$\begin{aligned} \text{Andy} &= x & x + x + 18 &= 144 \\ \text{Lou} &= x + 18 & 2x + 18 &= 144 & 2x &= 126 & x &= 63 \end{aligned}$$

5. David weighs twice as much as John and the total of their weight is 291 pounds. How much does John weigh? 97 How much does David weigh? 194

$$\begin{aligned} \text{John} &= x & x + 2x &= 291 \\ \text{David} &= 2x & 3x &= 291 & x &= 97 \end{aligned}$$

6. Benny weighs 3 times as much as his son Benny Jr. If their combined weight is 320 pounds, how much does Benny Jr. weigh? 80 How much does Benny weigh? 240

$$\begin{aligned} \text{B Jr} &= x & x + 3x &= 320 \\ \text{B} &= 3x & 4x &= 320 & x &= 80 \end{aligned}$$

BMI -- Body Mass Index: BMI for Adults

Body Mass Index or BMI is a tool for indicating weight status in adults. It is a measure of weight for height. For adults over 20 years old, BMI falls into one of these categories:

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

$$\text{Body Mass Index} = \frac{\text{weight in pounds}}{\text{Height in inches}^2} \times 703$$

BMI = (weight in pounds divided by height in inches squared) times 703

Find the body mass and weight status of the following people.

1. 5 feet 5 inches tall and 144 pounds _____
2. 5'8" tall and 184 pounds _____
3. 5 ft. and 5 in. tall and 180 lbs. _____
4. 5'4" tall and 105 pounds _____
5. Find your own BMI _____



Check your answers using the Body Mass Index Table on the next page.

Body Mass Index Table

To use the table, find the appropriate height in the left-hand column labeled Height. Move across to a given weight (in pounds). The number at the top of the column is the BMI at that height and weight. Pounds have been rounded off.

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)	Body Weight (pounds)																
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

The Cricket Formula

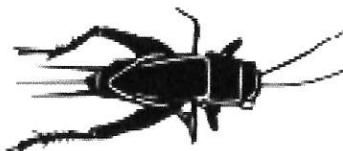
Scientists have discovered that crickets can be used as thermometers. They observed, experimented, and came up with a formula to calculate the temperature based on the number of times a cricket chirps.

$T = c/4 + 37$ **T = the approximate temperature in Fahrenheit**

C = the number of times a cricket chirps in one minute

Use the cricket formula to answer the following questions.

1. What is the approximate temperature if you hear a cricket chirp 100 times in one minute? _____
2. What is the approximate temperature if you hear a cricket chirping 160 times in one minute? _____
3. What is the approximate temperature if you hear a cricket chirping 200 times in one minute? _____
4. Based on your answers, what have you noticed about temperature and crickets? _____
5. About how many times should you hear a cricket chirp if the temperature is 97 degrees? _____



Converting Temperatures (A)

A guide for converting between Celsius and Fahrenheit.

Convert Celsius to Fahrenheit

Multiply °C by 1.8; add 32.

$$F = C \times 1.8 + 32$$

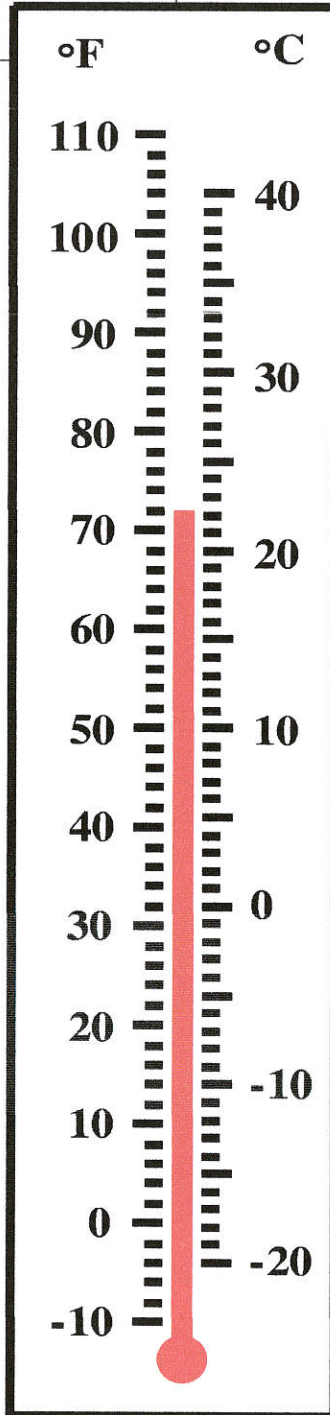
Convert Fahrenheit to Celsius

Subtract 32 from °F; divide by 1.8.

$$C = \frac{(F - 32)}{1.8}$$

Whole Numbers

°C	°F
40	104
35	95
30	86
25	77
20	68
15	59
10	50
5	41
0	32
-5	23
-10	14
-15	5
-20	-4
-25	-13
-30	-22
-35	-31
-40	-40



Temperature of the Sun

5505 °C or 9941 °F

Boiling Point of Water

100 °C or 212 °F

Human Body Temperature

37 °C or 98.6 °F

Room Temperature

20 °C or 68 °F

Freezing Point of Water

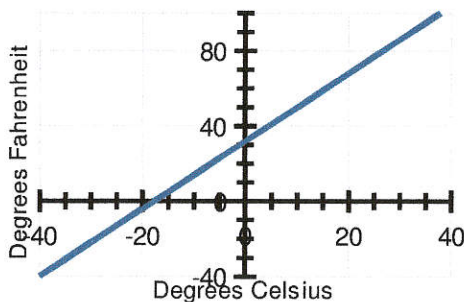
0 °C or 32 °F

Same Value

-40 °C or -40 °F

Absolute Zero

-273 °C or -459.4 °F



Alternate Formulas

$$F = C \times \frac{9}{5} + 32$$

$$C = (F - 32) \times \frac{5}{9}$$

Converting Celsius to Fahrenheit (A)

Estimate or convert the temperatures.

$81\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$20\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$41\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$78\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$46\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$27\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$38\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$91\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$4\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$68\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$60\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$17\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$9\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$7\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$30\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$75\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$23\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$98\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$95\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$20\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$46\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$85\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$47\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$69\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$96\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$38\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$59\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$54\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$49\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

$56\text{ }^{\circ}\text{C} = \text{ ______ }^{\circ}\text{F}$

Converting Celsius to Fahrenheit (A) Answers

Estimate or convert the temperatures.

$81\text{ }^{\circ}\text{C} = 177.8\text{ }^{\circ}\text{F}$

$20\text{ }^{\circ}\text{C} = 68\text{ }^{\circ}\text{F}$

$41\text{ }^{\circ}\text{C} = 105.8\text{ }^{\circ}\text{F}$

$78\text{ }^{\circ}\text{C} = 172.4\text{ }^{\circ}\text{F}$

$46\text{ }^{\circ}\text{C} = 114.8\text{ }^{\circ}\text{F}$

$27\text{ }^{\circ}\text{C} = 80.6\text{ }^{\circ}\text{F}$

$38\text{ }^{\circ}\text{C} = 100.4\text{ }^{\circ}\text{F}$

$91\text{ }^{\circ}\text{C} = 195.8\text{ }^{\circ}\text{F}$

$4\text{ }^{\circ}\text{C} = 39.2\text{ }^{\circ}\text{F}$

$68\text{ }^{\circ}\text{C} = 154.4\text{ }^{\circ}\text{F}$

$60\text{ }^{\circ}\text{C} = 140\text{ }^{\circ}\text{F}$

$17\text{ }^{\circ}\text{C} = 62.6\text{ }^{\circ}\text{F}$

$9\text{ }^{\circ}\text{C} = 48.2\text{ }^{\circ}\text{F}$

$7\text{ }^{\circ}\text{C} = 44.6\text{ }^{\circ}\text{F}$

$30\text{ }^{\circ}\text{C} = 86\text{ }^{\circ}\text{F}$

$75\text{ }^{\circ}\text{C} = 167\text{ }^{\circ}\text{F}$

$23\text{ }^{\circ}\text{C} = 73.4\text{ }^{\circ}\text{F}$

$98\text{ }^{\circ}\text{C} = 208.4\text{ }^{\circ}\text{F}$

$95\text{ }^{\circ}\text{C} = 203\text{ }^{\circ}\text{F}$

$20\text{ }^{\circ}\text{C} = 68\text{ }^{\circ}\text{F}$

$46\text{ }^{\circ}\text{C} = 114.8\text{ }^{\circ}\text{F}$

$85\text{ }^{\circ}\text{C} = 185\text{ }^{\circ}\text{F}$

$47\text{ }^{\circ}\text{C} = 116.6\text{ }^{\circ}\text{F}$

$69\text{ }^{\circ}\text{C} = 156.2\text{ }^{\circ}\text{F}$

$96\text{ }^{\circ}\text{C} = 204.8\text{ }^{\circ}\text{F}$

$38\text{ }^{\circ}\text{C} = 100.4\text{ }^{\circ}\text{F}$

$59\text{ }^{\circ}\text{C} = 138.2\text{ }^{\circ}\text{F}$

$54\text{ }^{\circ}\text{C} = 129.2\text{ }^{\circ}\text{F}$

$49\text{ }^{\circ}\text{C} = 120.2\text{ }^{\circ}\text{F}$

$56\text{ }^{\circ}\text{C} = 132.8\text{ }^{\circ}\text{F}$

Converting Fahrenheit to Celsius (A)

Estimate or convert the temperatures.

$91^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$82^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$38^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$68^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$95^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$74^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$33^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$82^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$41^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$90^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$72^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$74^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$46^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$39^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$44^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$46^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$81^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$76^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$79^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$85^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$33^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$60^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$61^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$68^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$95^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$83^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$86^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$45^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$54^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

$52^{\circ}\text{F} = \underline{\quad}^{\circ}\text{C}$

Converting Fahrenheit to Celsius (A) Answers

Estimate or convert the temperatures.

$91^{\circ}\text{F} = 32.8^{\circ}\text{C}$

$82^{\circ}\text{F} = 27.8^{\circ}\text{C}$

$38^{\circ}\text{F} = 3.3^{\circ}\text{C}$

$68^{\circ}\text{F} = 20^{\circ}\text{C}$

$95^{\circ}\text{F} = 35^{\circ}\text{C}$

$74^{\circ}\text{F} = 23.3^{\circ}\text{C}$

$33^{\circ}\text{F} = 0.6^{\circ}\text{C}$

$82^{\circ}\text{F} = 27.8^{\circ}\text{C}$

$41^{\circ}\text{F} = 5^{\circ}\text{C}$

$90^{\circ}\text{F} = 32.2^{\circ}\text{C}$

$72^{\circ}\text{F} = 22.2^{\circ}\text{C}$

$74^{\circ}\text{F} = 23.3^{\circ}\text{C}$

$46^{\circ}\text{F} = 7.8^{\circ}\text{C}$

$39^{\circ}\text{F} = 3.9^{\circ}\text{C}$

$44^{\circ}\text{F} = 6.7^{\circ}\text{C}$

$46^{\circ}\text{F} = 7.8^{\circ}\text{C}$

$81^{\circ}\text{F} = 27.2^{\circ}\text{C}$

$76^{\circ}\text{F} = 24.4^{\circ}\text{C}$

$79^{\circ}\text{F} = 26.1^{\circ}\text{C}$

$85^{\circ}\text{F} = 29.4^{\circ}\text{C}$

$33^{\circ}\text{F} = 0.6^{\circ}\text{C}$

$60^{\circ}\text{F} = 15.6^{\circ}\text{C}$

$61^{\circ}\text{F} = 16.1^{\circ}\text{C}$

$68^{\circ}\text{F} = 20^{\circ}\text{C}$

$95^{\circ}\text{F} = 35^{\circ}\text{C}$

$83^{\circ}\text{F} = 28.3^{\circ}\text{C}$

$86^{\circ}\text{F} = 30^{\circ}\text{C}$

$45^{\circ}\text{F} = 7.2^{\circ}\text{C}$

$54^{\circ}\text{F} = 12.2^{\circ}\text{C}$

$52^{\circ}\text{F} = 11.1^{\circ}\text{C}$



Calorie Count

Calories describe the amount of energy foods supply. Proteins (p) and carbohydrates (c) provide 4 calories/gram. Fat (f) provides 9 calories/gram.

$$\text{Calories} = 4p + 4c + 9f \text{ when } p, c, \text{ and } f \text{ are given in grams.}$$

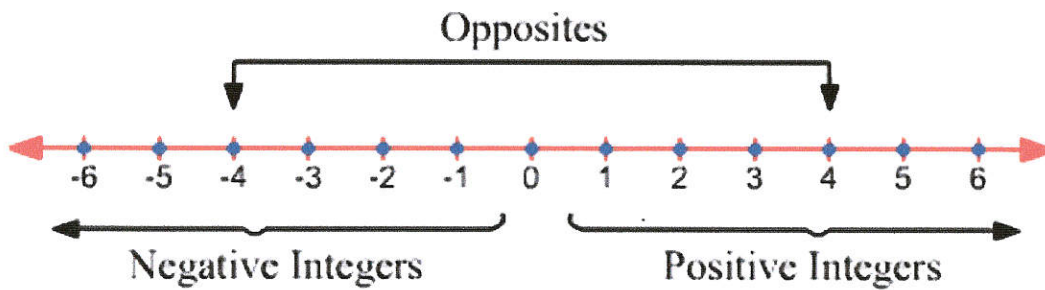
Calculate the calories in each serving. Place the letter of the correct answer above the problem number to discover the name of the apparatus used to measure calories.

1. Chocolate-covered peanut butter heart: protein-3 g; carbohydrate-20 g; fat-11 g
 A) 191 B) 201 C) 236
2. Hamburger sandwich: protein-13 g; carbohydrate-34 g; fat-9 g
 Q) 224 R) 269 S) 289
3. French fries: protein-6 g; carbohydrate-57 g; fat-22 g
 K) 325 L) 370 M) 450
4. Corn chips: protein-2 g; carbohydrate-15 g; fat-10 g
 R) 108 S) 138 T) 158
5. Garden cheddar tuna casserole: protein-7 g; carbohydrate-34 g; fat-4 g
 L) 200 M) 180 N) 160
6. Macaroni and cheese: protein-11 g; carbohydrate-47 g; fat-2 g
 N) 240 O) 250 P) 295
7. Oat cereal with skim milk: protein-3 g; carbohydrate-22 g; fat-2 g
 I) 118 J) 123 K) 128
8. 2% milk: protein-8 g; carbohydrate-12 g; fat-5 g
 A) 100 E) 125 I) 140
9. Crackers and cheese spread: protein-3 g; carbohydrate-9 g; fat-7 g
 B) 76 C) 111 D) 131
10. Yellow cake: protein-2 g; carbohydrate-34 g; fat-3 g
 A) 151 B) 171 C) 191

10 6 3 10 9 1 5 6 2 7 3 8 4 8 2

FROM:

Operations with Integers



What is Absolute Value?

Absolute value describes the distance of a number on the number line from 0 without considering which direction from zero the number lies. The absolute value of a number is never negative.

- The absolute value of 5 is 5.

Distance from 0: 5 units



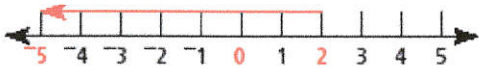
- The absolute value of -5 is 5.

Distance from 0: 5 units



- The absolute value of $2 + -7$ is 5.

Distance of sum from 0: 5 units



- The absolute value of 0 is 0. (This is why we **don't** say that the absolute value of a number is positive: Zero is neither negative nor positive.)

The symbol for absolute value is two straight lines surrounding the number or expression for which you wish to indicate absolute value.

- $|6| = 6$ means the absolute value of 6 is 6.
- $|-6| = 6$ means the absolute value of -6 is 6.

Name: _____

Score: _____

Absolute Value

Find the value:

1) $ 5 = \square$	2) $ -13 = \square$	3) $ 2 = \square$
4) $ -11 = \square$	5) $ 7 = \square$	6) $ -4 = \square$
7) $ 3 = \square$	8) $ -14 = \square$	9) $ 10 = \square$
10) $ -13 = \square$	11) $ 1 = \square$	12) $ -7 = \square$
13) $ 9 = \square$	14) $ -5 = \square$	15) $ 11 = \square$
16) $ -7 = \square$	17) $ 8 = \square$	18) $ -15 = \square$
19) $ 2 = \square$	20) $ -9 = \square$	21) $ 4 = \square$
22) $ -3 = \square$	23) $ 12 = \square$	24) $ -6 = \square$

Name: _____

Score: _____

Answers:

1) $ 5 = 5$	2) $ -13 = 13$	3) $ 2 = 2$
4) $ -11 = 11$	5) $ 7 = 7$	6) $ -4 = 4$
7) $ 3 = 3$	8) $ -14 = 14$	9) $ 10 = 10$
10) $ -13 = 13$	11) $ 1 = 1$	12) $ -7 = 7$
13) $ 9 = 9$	14) $ -5 = 5$	15) $ 11 = 11$
16) $ -7 = 7$	17) $ 8 = 8$	18) $ -15 = 15$
19) $ 2 = 2$	20) $ -9 = 9$	21) $ 4 = 4$
22) $ -3 = 3$	23) $ 12 = 12$	24) $ -6 = 6$

Name _____

Date _____

Integers

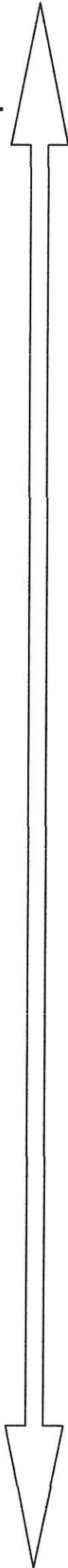
Write an integer to represent each description.

1. 5 units to the left of 11 on a number line.	2. An altitude of 8900 feet.
3. The stock market went down 291 points today.	4. A loss of \$37,535 on an investment.
5. 20° below zero.	6. Deposit \$1,546 into a bank account.
7. The opposite of 271.	8. 8 units to the left of -5 on a number line.
9. The football player had a 15 yard loss on the play.	10. A pay cut of \$3,500.
11. Withdraw \$1,794 from an ATM machine.	12. A gain of twelve pounds.
13. 78° above zero.	14. 15 units to the right of 4 on a number line.
15. The stock market went up 243 points today.	16. A raise of \$8,000.
17. The football player had a 16 yard gain on the play.	18. 15 units to the right on a number line.
19. 8 units to the left on a number line.	20. One hundred twenty-one feet below sea level.

Adapted from edhelper.com

Make your own number line.
Number from +20 to -20

Start with 0 in the middle.



USING A NUMBER LINE

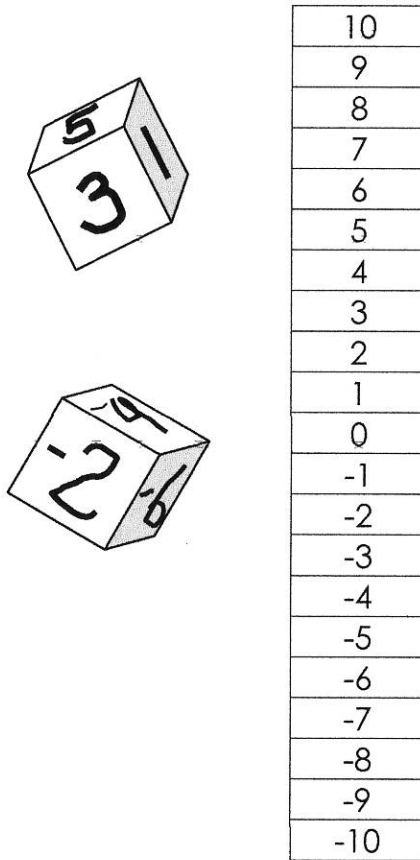
Use a number line or thermometer to answer the following questions.

1. Which temperature is colder, -10° or -5° ? _____
2. Which number is smaller, -10 or -5 ? _____
3. Which temperature is warmer, -5° or -1° ? _____
4. Which number is larger, -5 or -1 ? _____
5. Put the following numbers in order from **smallest to largest**.
 $5, -8, -3, 0, 2, -1, 1$ _____
6. Put the following numbers in order from **largest to smallest**.
 $10, -25, 1, 0, -50, 15, -2, -9$ _____

7. The temperature was -2° at dawn and 12° at noon. How many degrees did the temperature rise ? _____
8. The temperature was -5° at dawn and 23° at 4:00pm. How many degrees did the temperature rise ? _____
9. The temperature was 20° at noon and -12° by midnight. How many degrees did the temperature fall ? _____
10. The temperature was -2° at dawn and -7° at noon. How many degrees did the temperature fall ? _____

RACE TO 10

Race to 10 is a game to help students internalize the rules for adding positive and negative numbers. To play this game, make an enlarged version of the game board below for each pair of students.



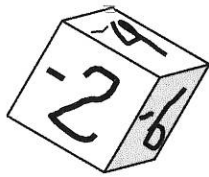
Also, you need to make two number cubes for each pair of students. The most inexpensive way to make these is to use wooded cubes, available at craft stores. Write 1, 2, 3, 4, 5, and 6 on one die and -1, -2, -3, -4, -5, and -6 on the other die.

Each student places a marker of some kind (I usually use two different colored paper clips) at zero. Students take turns rolling the two dice and adding the results. The answer tells them how many spaces to move up (positive result) or down (negative result).

For example, if Player A rolls a -3 and a 5, the sum is 2, so the player moves two spaces up. On her following turn, if player A rolls a 1 and a -6, the sum is -5, so the player moves down 5 spaces, ending up at -3.

Players take turns. The first player to get off the board either in the positive direction or the negative direction wins

****This is one of my favorite games developed by Ruth Estabrook. You can find other excellent learning games in **Active Mathematics**, available free from the NH Bureau of Adult Education Mini-grant program.



10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10

Wild Temperature Changes

Some Outstanding Temperature Falls

1. **In 24 hours:** Browning, Mont., Jan. 23–24, 1916, from 44°F to –56°F.
2. **In 12 hours:** Fairfield, Mont., Dec. 24, 1924, from 63°F at noon to –21°F at midnight.
3. **In 2 hours:** Rapid City, S.D., Jan. 12, 1911, from 49°F at 6:00 A.M. to –13°F at 8:00 A.M.
4. **In 27 minutes:** Spearfish, S.D., Jan. 22, 1943, from 54°F at 9:00 A.M. to –4°F at 9:27 A.M.
5. **In 15 minutes:** Rapid City, S.D., Jan. 10, 1911, from 55°F at 7:00 A.M. to 8°F at 7:15 A.M.

Some Outstanding Temperature Rises

1. **In 12 hours:** Granville, N.D., Feb. 21, 1918, from –33°F to 50°F from early morning to late afternoon.
2. **In 15 minutes:** Fort Assiniboine, Mont., Jan. 19, 1892, from –5°F to 37°F.
3. **In seven minutes:** Kipp, Mont., Dec. 1, 1896. The observer also reported that a total rise of 80°F occurred in a few hours and that 30 in. of snow disappeared in half a day.
4. **In two minutes:** Spearfish, S.D., Jan. 22, 1943, from –4°F at 7:30 A.M. to 45°F at 7:32 A.M.



WILD TEMPERATURE CHANGES

Use the Wild Temperature Change data to answer the following questions.

1. How many degrees did the temperature fall in Browing, MT in 24 hours on Jan. 23 – 24 in 1916? _____
2. How many degrees did the temperature fall in 12 hours on 12-24-24 in Fairfield, MT? _____
3. How many degrees did the temperature fall in 2 hours in Rapid City, SD on 1-12-1911? _____
4. How many degrees did the temperature drop in 27 minutes in Spearfish, SD on 1-22-1943? _____
5. How many degrees did the temperature drop in Rapid City, SD in just 15 minutes on 1-10-1911? _____

1. How many degrees did the temperature rise in 12 hours in Granville, ND on 2-21-1918? _____
2. How many degrees did the temperature rise in 15 minutes in Fort Assiniboine, MT on 1-19-1892? _____
3. How many degrees did the temperature rise in 7 minutes in Kipp, MT on 12-1-1896? _____
4. How many degrees did the temperature rise in 2 minutes in Spearfish, SD on 1-22-1943? _____

WIND CHILL CHART

Use the National Weather Service Wind Chill Chart to answer the following questions.

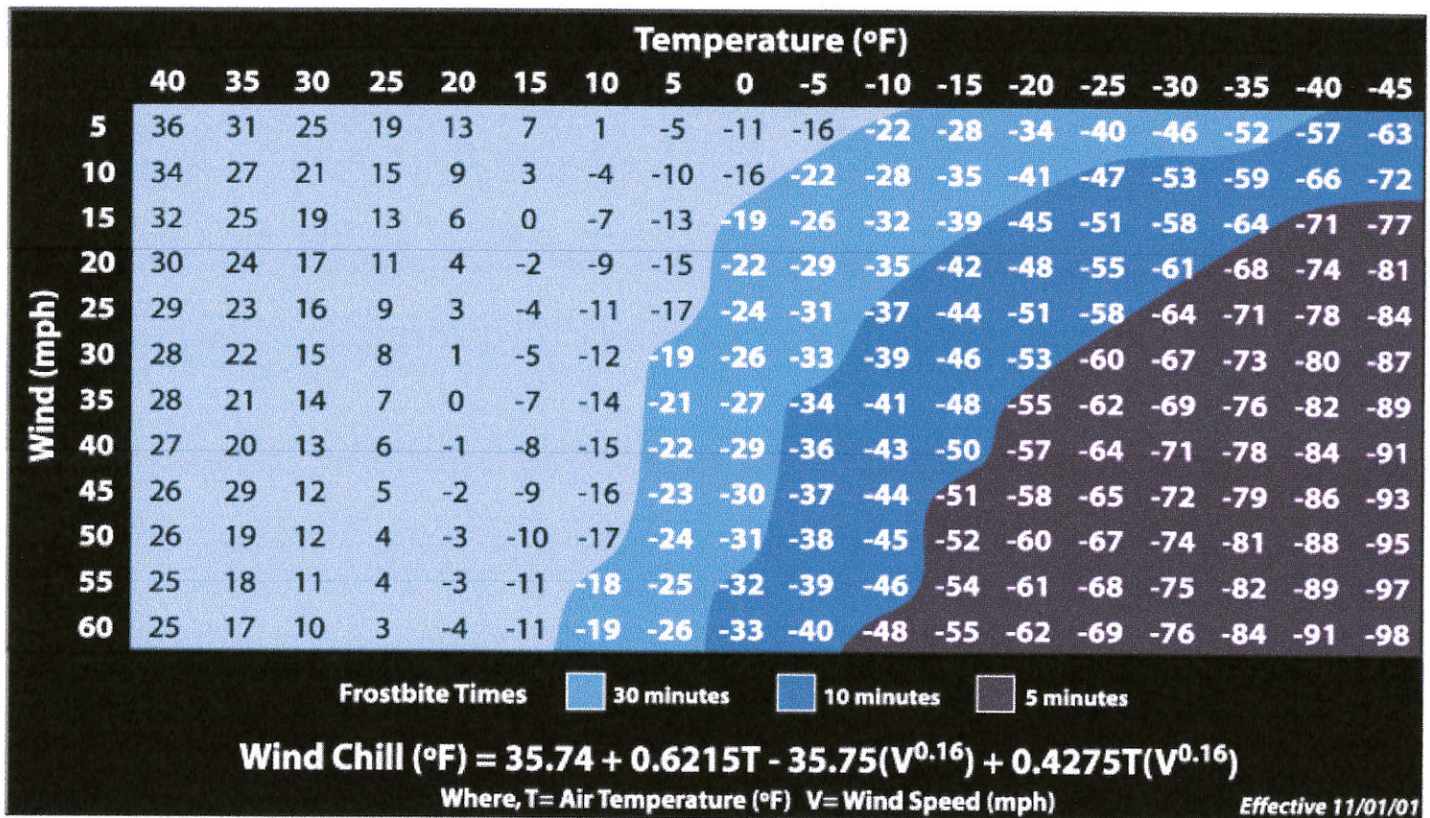
1. If the temperature outside is 20 degrees and the wind is blowing at 10 miles per hour, what is the wind chill temperature ? _____
2. Temperature is 20 degrees, wind is 20 mph, wind chill temp. is _____
3. Temperature is 10 degrees, wind is 15 mph, wind chill temp. is _____
4. Temperature is 0 degrees, wind is 10 mph, wind chill temp. is _____
5. Temperature is 0 degrees, wind is 20 mph, wind chill temp. is _____
6. Temperature is -5 degrees, wind is 5 mph, wind chill temp. is _____
7. Temperature is -5 degrees, wind is 30 mph, wind chill temp. is _____
8. Temperature is 15 degrees, wind is 50 mph, wind chill temp. is _____
9. Temperature is 5 degrees, wind is 25 mph, wind chill temp. is _____
10. Temperature is -10 degrees, wind is 10 mph, wind chill temp. is _____
11. If the temperature is 30 degrees and the wind chill factor is 15 degrees, how many miles per hour must the wind be blowing ? _____
12. Temperature is 30 degrees, wind chill factor is 10 degrees, mph wind _____
13. Temperature is 20 degrees, wind chill factor is 0 degrees, mph wind _____
14. Temperature is 10 degrees, wind chill factor is -15 degrees, mph wind _____
15. Temperature is 0 degrees, wind chill factor is -16 degrees, mph wind _____
16. If the wind is blowing at 15 miles per hour and the wind chill factor is -7 degrees, what must the temperature be ? _____
17. Wind is 15 mph, wind chill factor is -2 degrees, temperature _____
18. Wind is 20 mph, wind chill factor is 0 degrees, temperature _____

19. Wind is 10 mph, wind chill factor is -10 degrees, temperature _____

20. Wind is 25 mph, wind chill factor is -17 degrees, temperature _____



Wind Chill Chart



Positive and Negative Integers with Operations**Adding Rules:**

Positive + Positive = Positive

$5 + 4 = 9$

Negative + Negative = Negative

$(-7) + (-2) = -9$

$(-7) + 4 = -3$

Sum of a negative and a positive number

$6 + (-9) = -3$

Use the sign of the larger number and subtract

$(-3) + 7 = 4$

$5 + (-3) = 2.$

Subtracting Rules:

Negative - Positive = Negative

$(-5) - 3 = -5 + (-3) = -8$

Positive - Negative = Positive + Positive =
Positive

$5 - (-3) = 5 + 3 = 8$

Negative - Negative = Negative + Positive =

$(-5) - (-3) = (-5) + 3 = -2$

Use the sign of the larger number and subtract
(Change double negatives to a positive shown in red.)

$(-3) - (-5) = (-3) + 5 = 2$

Multiplying Rules

Positive x Positive = Positive

$3 \times 2 = 6$

Negative x Negative = Positive

$(-2) \times (-8) = 16$

Negative x Positive = Negative

$(-3) \times 4 = -12$

Positive x Negative = Negative

$3 \times (-4) = -12$

Dividing Rules

Positive ÷ Positive = Positive

$12 \div 3 = 4$

Negative ÷ Negative = Positive

$(-12) \div (-3) = 4$

Negative ÷ Positive = Negative

$(-12) \div 3 = -4$

Positive ÷ Negative = Negative

$12 \div (-3) = -4$

Name : _____

Score : _____

Teacher : _____

Date : _____

1) $9 + 0 =$

2) $-9 + 8 =$

3) $4 + 9 =$

4) $-4 + -4 =$

5) $2 + 1 =$

6) $6 + 5 =$

7) $-2 + -8 =$

8) $-1 + 8 =$

9) $-6 + -6 =$

10) $9 + 8 =$

11) $-9 + -4 =$

12) $-5 + -5 =$

13) $-1 + -6 =$

14) $6 + 2 =$

15) $3 + -6 =$

16) $0 + 1 =$

17) $2 + -9 =$

18) $9 + -8 =$

19) $0 + 2 =$

20) $-5 + -7 =$



Name : _____

Score : _____

Teacher : _____

Date : _____

1) $9 + 0 = 9$

2) $-9 + 8 = -1$

3) $4 + 9 = 13$

4) $-4 + -4 = -8$

5) $2 + 1 = 3$

6) $6 + 5 = 11$

7) $-2 + -8 = -10$

8) $-1 + 8 = 7$

9) $-6 + -6 = -12$

10) $9 + 8 = 17$

11) $-9 + -4 = -13$

12) $-5 + -5 = -10$

13) $-1 + -6 = -7$

14) $6 + 2 = 8$

15) $3 + -6 = -3$

16) $0 + 1 = 1$

17) $2 + -9 = -7$

18) $9 + -8 = 1$

19) $0 + 2 = 2$

20) $-5 + -7 = -12$



Name : _____

Score : _____

Teacher : _____

Date : _____

1) $(+1) - (+8) =$

2) $(-8) - (+5) =$

3) $(+5) - (+6) =$

4) $(+9) - (-5) =$

5) $(-3) - (0) =$

6) $(+4) - (+9) =$

7) $(+8) - (+3) =$

8) $(0) - (0) =$

9) $(-7) - (-1) =$

10) $(-5) - (+1) =$

11) $(+9) - (+2) =$

12) $(+9) - (+6) =$

13) $(-6) - (0) =$

14) $(-2) - (-1) =$

15) $(-1) - (+3) =$

16) $(+9) - (+3) =$

17) $(+9) - (-1) =$

18) $(-7) - (+1) =$

19) $(-4) - (0) =$

20) $(+6) - (+2) =$



Name : _____

Score : _____

Teacher : _____

Date : _____

1) $(+1) - (+8) = -7$

2) $(-8) - (+5) = -13$

3) $(+5) - (+6) = -1$

4) $(+9) - (-5) = 14$

5) $(-3) - (0) = -3$

6) $(+4) - (+9) = -5$

7) $(+8) - (+3) = 5$

8) $(0) - (0) = 0$

9) $(-7) - (-1) = -6$

10) $(-5) - (+1) = -6$

11) $(+9) - (+2) = 7$

12) $(+9) - (+6) = 3$

13) $(-6) - (0) = -6$

14) $(-2) - (-1) = -1$

15) $(-1) - (+3) = -4$

16) $(+9) - (+3) = 6$

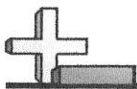
17) $(+9) - (-1) = 10$

18) $(-7) - (+1) = -8$

19) $(-4) - (0) = -4$

20) $(+6) - (+2) = 4$





Use addition or subtraction to solve the following problems.

Answers

1) $(-7) + (-3) =$ _____

2) $(-9) + (-5) =$ _____

3) $(-7) + (-6) =$ _____

4) $-2 + 3 =$ _____

5) $-4 + 1 =$ _____

6) $-8 + 3 =$ _____

7) $(-10) - (-4) =$ _____

8) $(-3) - (-3) =$ _____

9) $(-8) - (-3) =$ _____

10) $-3 - 3 =$ _____

11) $-3 - 4 =$ _____

12) $-9 - 10 =$ _____

13) $8 - (-5) =$ _____

14) $3 - (-4) =$ _____

15) $6 - (-9) =$ _____

16) $10 + (-1) =$ _____

17) $9 + (-8) =$ _____

18) $8 + (-4) =$ _____

19) $9 - (-6) =$ _____

20) $9 - (-5) =$ _____

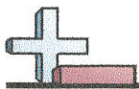
21) $8 - (-3) =$ _____

22) $1 - 3 =$ _____

23) $7 - 9 =$ _____

24) $6 - 10 =$ _____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____



Use addition or subtraction to solve the following problems.

1) $(-7) + (-3) =$ _____

2) $(-9) + (-5) =$ _____

3) $(-7) + (-6) =$ _____

4) $-2 + 3 =$ _____

5) $-4 + 1 =$ _____

6) $-8 + 3 =$ _____

7) $(-10) - (-4) =$ _____

8) $(-3) - (-3) =$ _____

9) $(-8) - (-3) =$ _____

10) $-3 - 3 =$ _____

11) $-3 - 4 =$ _____

12) $-9 - 10 =$ _____

13) $8 - (-5) =$ _____

14) $3 - (-4) =$ _____

15) $6 - (-9) =$ _____

16) $10 + (-1) =$ _____

17) $9 + (-8) =$ _____

18) $8 + (-4) =$ _____

19) $9 - (-6) =$ _____

20) $9 - (-5) =$ _____

21) $8 - (-3) =$ _____

22) $1 - 3 =$ _____

23) $7 - 9 =$ _____

24) $6 - 10 =$ _____

Answers

1. **-10**

2. **-14**

3. **-13**

4. **1**

5. **-3**

6. **-5**

7. **-6**

8. **0**

9. **-5**

10. **-6**

11. **-7**

12. **-19**

13. **13**

14. **7**

15. **15**

16. **9**

17. **1**

18. **4**

19. **15**

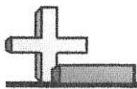
20. **14**

21. **11**

22. **-2**

23. **-2**

24. **-4**



Use multiplication or division to solve the following problems.

Answers

1) $(-10) \times (-3) =$ _____

2) $(-8) \times (-10) =$ _____

3) $(-8) \times (-5) =$ _____

4) $-4 \times 9 =$ _____

5) $-6 \times 6 =$ _____

6) $-2 \times 7 =$ _____

7) $7 \div (-1) =$ _____

8) $24 \div (-4) =$ _____

9) $40 \div (-4) =$ _____

10) $-70 \div 7 =$ _____

11) $-8 \div 1 =$ _____

12) $-8 \div 4 =$ _____

13) $-4 \div (-1) =$ _____

14) $-54 \div (-9) =$ _____

15) $-63 \div (-9) =$ _____

16) $8 \times (-2) =$ _____

17) $9 \times (-1) =$ _____

18) $3 \times (-3) =$ _____

19) $-9 \div (-9) =$ _____

20) $-40 \div (-10) =$ _____

21) $-1 \div (-1) =$ _____

22) $72 \div 9 =$ _____

23) $35 \div 7 =$ _____

24) $6 \div 3 =$ _____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____



Use multiplication or division to solve the following problems.

- 1) $(-10) \times (-3) =$ _____
- 2) $(-8) \times (-10) =$ _____
- 3) $(-8) \times (-5) =$ _____
- 4) $-4 \times 9 =$ _____
- 5) $-6 \times 6 =$ _____
- 6) $-2 \times 7 =$ _____
- 7) $7 \div (-1) =$ _____
- 8) $24 \div (-4) =$ _____
- 9) $40 \div (-4) =$ _____
- 10) $-70 \div 7 =$ _____
- 11) $-8 \div 1 =$ _____
- 12) $-8 \div 4 =$ _____
- 13) $-4 \div (-1) =$ _____
- 14) $-54 \div (-9) =$ _____
- 15) $-63 \div (-9) =$ _____
- 16) $8 \times (-2) =$ _____
- 17) $9 \times (-1) =$ _____
- 18) $3 \times (-3) =$ _____
- 19) $-9 \div (-9) =$ _____
- 20) $-40 \div (-10) =$ _____
- 21) $-1 \div (-1) =$ _____
- 22) $72 \div 9 =$ _____
- 23) $35 \div 7 =$ _____
- 24) $6 \div 3 =$ _____

Answers

- 1. **30**
- 2. **80**
- 3. **40**
- 4. **-36**
- 5. **-36**
- 6. **-14**
- 7. **-7**
- 8. **-6**
- 9. **-10**
- 10. **-10**
- 11. **-8**
- 12. **-2**
- 13. **4**
- 14. **6**
- 15. **7**
- 16. **-16**
- 17. **-9**
- 18. **-9**
- 19. **1**
- 20. **4**
- 21. **1**
- 22. **8**
- 23. **5**
- 24. **2**

All Operations with Integers (A)

Use an integer strategy to find each answer.

$9 - 6 =$

$(-5) + 7 =$

$(-9) + (-2) =$

$7 - (-2) =$

$(-2) + 2 =$

$(-8) - 1 =$

$5 - (-1) =$

$2 + 1 =$

$7 + 1 =$

$15 \div 3 =$

$8 \div (-4) =$

$(-4) - 4 =$

$9 \times (-8) =$

$25 \div (-5) =$

$1 + 7 =$

$4 \div 2 =$

$(-6) \times (-1) =$

$5 \times 6 =$

$16 \div 2 =$

$5 + 5 =$

$(-5) \times (-2) =$

$6 \times (-8) =$

$9 + (-7) =$

$(-27) \div (-3) =$

$9 - 1 =$

$4 \times (-7) =$

$(-2) - 7 =$

$3 + 4 =$

$(-6) - (-1) =$

$5 - (-4) =$

All Operations with Integers (A) Answers

Use an integer strategy to find each answer.

$9 - 6 = 3$

$(-5) + 7 = 2$

$(-9) + (-2) = (-11)$

$7 - (-2) = 9$

$(-2) + 2 = 0$

$(-8) - 1 = (-9)$

$5 - (-1) = 6$

$2 + 1 = 3$

$7 + 1 = 8$

$15 \div 3 = 5$

$8 \div (-4) = (-2)$

$(-4) - 4 = (-8)$

$9 \times (-8) = (-72)$

$25 \div (-5) = (-5)$

$1 + 7 = 8$

$4 \div 2 = 2$

$(-6) \times (-1) = 6$

$5 \times 6 = 30$

$16 \div 2 = 8$

$5 + 5 = 10$

$(-5) \times (-2) = 10$

$6 \times (-8) = (-48)$

$9 + (-7) = 2$

$(-27) \div (-3) = 9$

$9 - 1 = 8$

$4 \times (-7) = (-28)$

$(-2) - 7 = (-9)$

$3 + 4 = 7$

$(-6) - (-1) = (-5)$

$5 - (-4) = 9$

Negative Numbers

Level 1

1) The coldest temperature ever recorded in Antarctica is approximately -120°F . The coldest temperature in Iowa is approximately -40°F . What is the difference between the two temperatures?

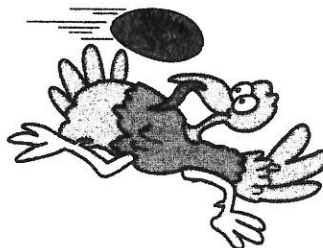


2) Travis was in debt \$70 while his friend Collin had \$48. If Joey was in debt \$12, what is the total amount of money the three friends have?

3) The daytime temperature on a January day in Fargo, North Dakota was 15°F . At midnight the temperature dropped to -17°F . How many degrees did the temperature drop?

4) Marissa lived in Colorado at an elevation of 9827 feet. Nathan lives at a location 84 feet below sea level. How many feet higher is Marissa's location than Nathan's?

5) A football player carried the ball 5 times during a game. He gained 15 yards on the first play, gained 11 yards on the second, lost 22 yards on the third carry, lost 9 yards on the fourth and had no gain or loss on the fifth carry. What was his total amount of yardage for the game?



6) $n + (-8) = 0$ What is the value of n that will make this equation true?

7) If n is equal to -8 , what is the value of the expression $n - (n)$?

Use the wind chill chart for questions 8-10

Wind Speed	Air Temperature		
	10	0	-10
10	-9	-22	-34
20	-24	-39	-53
30	-33	-49	-64

8) If the temperature is -10°F and the wind is blowing at 30 mph you would feel much colder than if there was no wind. How many degrees colder would you feel?

9) How much colder does it feel when the air temperature is 10°F and the wind is 30 mph compared to an air temperature of 10°F and a 10 mph wind?

10) Scott went outside when the wind was blowing at 10 mph and the temperature was 10°F . Ryan was playing outside when there was no wind, but the temperature was -10°F . Who felt colder?

ANSWERS

Negative Numbers

Level 1

1) The coldest temperature ever recorded in Antarctica is approximately -120°F . The coldest temperature in Iowa is approximately -40°F . What is the difference between the two temperatures?

80°



2) Travis was in debt \$70 while his friend Collin had \$48. If Joey was in debt \$12, what is the total amount of money the three friends have?

-34.00

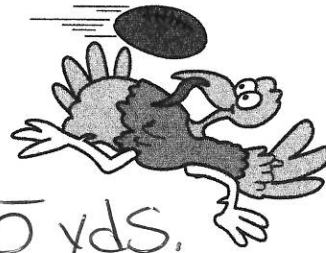
3) The daytime temperature on a January day in Fargo, North Dakota was 15°F . At midnight the temperature dropped to -17°F . How many degrees did the temperature drop?

32°

4) Marissa lived in Colorado at an elevation of 9827 feet. Nathan lives at a location 84 feet below sea level. How many feet higher is Marissa's location than Nathan's?

9911 ft.

5) A football player carried the ball 5 times during a game. He gained 15 yards on the first play, gained 11 yards on the second, lost 22 yards on the third carry, lost 9 yards on the fourth and had no gain or loss on the fifth carry. What was his total amount of yardage for the game?



-5 yds.

6) $n + (-8) = 0$ What is the value of n that will make this equation true?

8

7) If n is equal to -8 , what is the value of the expression $n - (n)$?

Use the wind chill chart for questions 8-10

Wind Speed	Air Temperature		
	10	0	-10
10	-9	-22	-34
20	-24	-39	-53
30	-33	-49	-64

$0 (-8 - -8 = 0)$

8) If the temperature is -10°F and the wind is blowing at 30 mph you would feel much colder than if there was no wind. How many degrees colder would you feel?

$54^{\circ} \text{ colder}$

9) How much colder does it feel when the air temperature is 10°F and the wind is 30 mph compared to an air temperature of 10°F and a 10 mph wind?

$24^{\circ} \text{ colder}$

10) Scott went outside when the wind was blowing at 10 mph and the temperature was 10°F . Ryan was playing outside when there was no wind, but the temperature was -10°F . Who felt colder?

Ryan (-10°)