Unpacking the Math HiSET Test

Part 2: Overview & Pre-Test Solutions

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HiSET™ Mathematics Overview

The Mathematics HiSET™ test is one of five subtests students must take and pass to earn their high school credentials. This test requires students to answer quantitative math problems by applying mathematical concepts, and by using reasoning and critical thinking skills.

The test is offered either on the computer or by pencil and paper. Each testing center has specific dates/times for each of these forms.

Students have 90 minutes to complete 50 multiple-choice questions and are allowed to use a Casio-c*fx*260 scientific calculator for all questions. Scrap paper is also available. Each question is in the form of a word problem or a visual graphic and includes 5 answer choices. Students should be encouraged to answer **ALL** 50 questions. Only correct answers are counted toward scoring. Although there are leveled questions easy-medium-hard, the questions are NOT ordered by difficulty.

The following mathematical topics are covered throughout the Math HiSET subtest:

- Numbers and Operations on Numbers
- Measurement/Geometry
- Data Analysis/Probability/Statistics
- Algebra Concepts

Standard scores will be represented on a 0-20 scale.

To pass the Math HiSET™ subtest students must earn a score of at least 8.

To pass the full HiSET™ exam students must attain all three of the following:

1. Achieve a score of at least 8 on each of the 5 subtests
2. Score at least 2 out of 6 on the essay portion of the writing subtest.
3. Have a total combined score on <u>ALL</u> 5 subtests of at least 45. (an average score of 9 per subtest)

On the scoring sheet all questions are grouped into one of the 4 mathematical topic categories: Numbers & Operations on Numbers, Measurement/Geometry, Data Analysis/Probability/Statistics, and Algebra Concepts. The report shows the "number correct" in each category.

Paper-based test scores will be delivered 3-5 business days after the test center submits answer sheet.

Official computer-based test scores are posted within 3 business days of completion. Unofficial scores are displayed immediately after completion of the test.

HiSET™ Mathematics Test

1. The HiSET™ test can be taken on paper or computer.
2. It is available in English or Spanish.
3. The mathematics test is 90 minutes long.
4. There are 50 multiple choice questions.
5. Each question has 5 answer choices.
6. A calculator may be used on the entire test; it will be provided by the testing center. All centers will have the Casio cfx260.
7. Questions are based on realistic situations.
8. The questions are designed to integrate knowledge of mathematics, so any questions may involve content from more than one content category.
9. Test-takers will need to make inferences or predictions based on data or information.
10. There are up to 6 questions based on one set of given information.
11. The test does not include a formula page. Some needed formulas are included with the question; perimeter, are, volume and Pythagorean Theorem are not.
12. Candidates will need to know basic linear measurement facts: 12inches = 1foot, 3 feet = 1 yard.
13. Most questions using metric measurement include the information in the question. Examples: 3.3feet ≈ 1meter, 1,000m = 1km. Candidates should have a basic understanding of the metric system.
14. Computer based tests will be scored immediately after completion. Paper based results will be available to the test taker online 1 to 2 weeks after completion.
15. Scores will be reported on a scale of 0to 20 for each of the 5 subtests. Passing the whole test will require a total of 45 points (average of 9) with no single subtest scoring below an 8.
16. Candidates are allowed to test 3 times in one calendar year.
17. Six new practice tests will be available in 2015.
18. AZTEC will be providing computer based HiSET™ prep. (Fee based)
19. McGraw-Hill will be releasing HiSET™ prep materials in fall 2014.
20. Accommodations are available and need to be requested Directly from ETS. Some accommodations are allowed without formal permission.
21. Find more information and practice test samples at hiset.ets.edu

1 **A used motorcycle can be purchased for $500 cash or on credit with a $200 down payment plus payments of $70 per month for 5 months. How much would be saved by paying cash?**

A $50
B $150
C $200
D $350
E $550

2 **A solution of salt water is made by dissolving 2 grams of salt in 1 liter of water. Which of the following would yield a solution with the same concentration?**

A Dissolving $\frac{1}{2}$ gram of salt in 2 liters of water
B Dissolving $\frac{1}{2}$ gram of salt in $\frac{1}{2}$ liter of water
C Dissolving 1 gram of salt in $\frac{1}{2}$ liter of water
D Dissolving 1 gram of salt in 2 liters of water
E Dissolving 2 grams of salt in $\frac{1}{2}$ liter of water

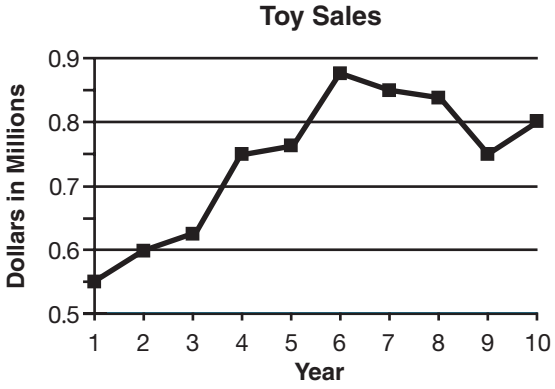
3 **An appliance store uses the following formula to set its selling prices.**

Price = (actual cost) + (25 percent of actual cost)

If the actual cost of a refrigerator is $800, what price will the store set for the refrigerator?

A $200
B $600
C $800
D $1,000
E $1,400

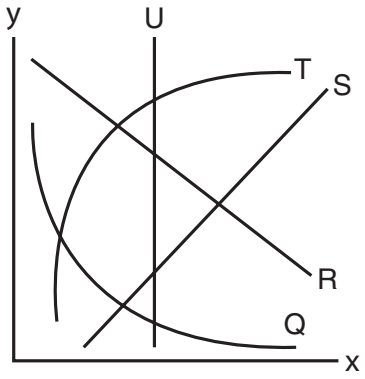
4 **The following graph shows the sales figures for a toy company since it opened 10 years ago.**



According to the graph, what was the approximate dollar value of sales in the company's 9th year of business?

A $75,000,000
B $7,500,000
C $750,000
D $75,000
E $7,500

5 **Consider the graphs below.**



Although the numbers are not included on either axis, it is possible to determine from shape and location that the equation $y = -1.2x + 4$ corresponds to graph

A Q.
B R.
C S.
D T.
E U.

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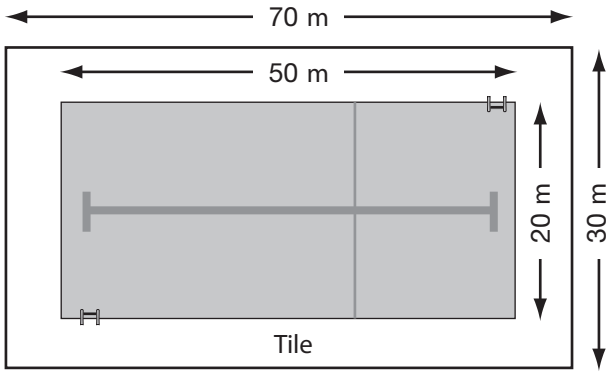
Directions: Questions 6 through 11 are based on the information below.

A city is going to build a new swimming pool at the recreation center. The illustration below shows the plans for the pool.



6 **Assuming that the pool is 10 feet deep, approximately how many cubic meters of water will this pool hold when filled? (3.3 feet ≈ 1 meter)**

A 1,000
B 3,000
C 10,000
D 30,000
E 100,000

7 **If one box of tiles covers 10 square meters, which of the following represents the number of boxes required to cover the designated area around the pool with tile?**

A $(70 \times 30) \div 10$
B $70 \times 30 \times 10$
C $(50 \times 20) \div 10$
D $[(70 \times 30) - (50 \times 20)] \div 10$
E $[(70 \times 30) - (50 \times 20)] \times 10$

8 **The Recreation Department wants to put in swim lanes along the length of the pool. If each swim lane must be 8 feet wide, which of the following represents the best estimate for the number of swim lanes there can be in the pool (3.3 feet ≈ 1 meter)?**

A $20 \div 8$
B $(20 \times 3.3) \div 8$
C $20 \div (3.3 \times 8)$
D $50 \div (8 \times 3.3)$
E $(50 \times 3.3) \div 8$

9 **To maintain water purity, each week $1\frac{1}{2}$ kilograms of a certain chemical should be added for each million liters of water. If the pool contains 2.5 million liters of water, how many kilograms of the chemical should be added each week?**

A 1.5
B 2.25
C 2.5
D 3.0
E 3.75

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10 **It is estimated that construction of this pool area will cost $75,000. A large corporation donated $35,000 toward the construction of the pool, and an additional $2,000 was earned during a local fund-raising activity. If 20 local businesses agree to donate the rest of the money, which of the following represents the average amount each business will have to contribute?**

A $\$75,000 - \$37,000$
B $(\$75,000 - \$2,000) \div 20$
C $20 \div (\$75,000 - \$37,000)$
D $\$75,000 \div 20$
E $(\$75,000 - \$37,000) \div 20$

11 **A larger diagram of the proposed swimming pool area will be presented to the city council. If each inch on that diagram represents 5 meters of actual distance, what are the overall dimensions of the pool area (including the tile area) in the diagram?**

A 4 inches by 2 inches
B 10 inches by 4 inches
C 14 inches by 6 inches
D 250 inches by 100 inches
E 350 inches by 150 inches

12 **The relationship between rate of speed (r), distance traveled (d), and time traveled (t) is given by the following equation.**

$$r = \frac{d}{t}$$

If rate remains constant, which of the following must be true?

A When t remains constant, d increases.
B When t decreases, d remains constant.
C When t decreases, d increases.
D When t increases, d decreases.
E When t decreases, d decreases.

13 **Consider the equation $2x - 3 = 4$. To solve the equation for x, what would be the most logical first step?**

A Add 3 to both sides of the equation.
B Subtract 3 from both sides of the equation.
C Divide both sides of the equation by -2.
D Multiply both sides of the equation by 2.
E Subtract 4 from both sides of the equation.

14 **A tank for mixing chemical solutions is 1.5 meters long, 0.6 meters wide, and 1.5 meters deep. Which of the following represents the maximum number of cubic meters of solution this tank will hold?**

A $(1.5 + 0.6) \times 1.5$
B $(1.5 + 1.5) \times 0.6$
C $1.5 \times 0.6 \times 1.5$
D $\frac{1.5 \times 1.5}{0.6}$
E $1.5 + 0.6 + 1.5$

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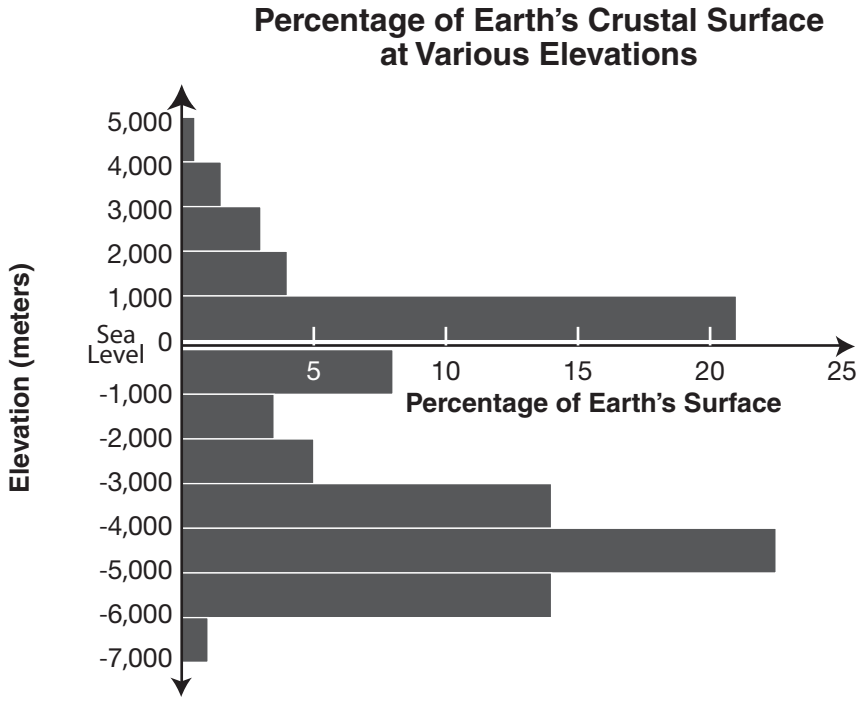
Directions: Questions 15 through 17 are based on the graph below, which shows the percentages of the Earth's surface at various elevations.



15 **Approximately what percentage of the Earth's surface is at or above sea level?**

A 22%
B 30%
C 50%
D 60%
E 100%

16 **Which of the following elevation intervals contains the highest percentage of the Earth's crustal surface?**

A 0 to 1,000
B −1,000 to 0
C −4,000 to −3,000
D −5,000 to −4,000
E −6,000 to −5,000

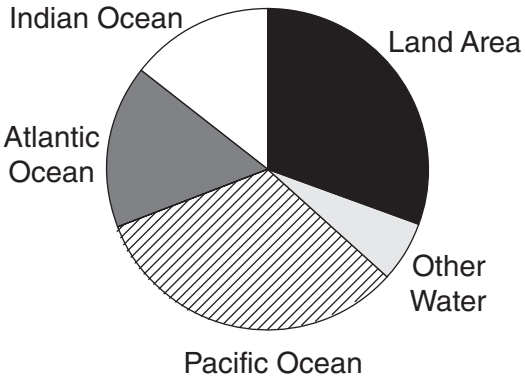
17 **Which of the following best approximates the difference between the highest elevations and the lowest elevations of the Earth's crustal surface? (1,000 m = 1 km)**

A 12 km
B 8 km
C 7 km
D 5 km
E 2 km

GO ON TO THE NEXT PAGE →

18 **Consider the circle graph below.**

Land and Water Areas on Earth



If the measure of the arc associated with the Pacific Ocean is approximately 125°, which of the following represents the proportion of Earth's surface that is covered by the Pacific Ocean?

A $\frac{125}{360-125}$

B $\frac{360-125}{360}$

C $\frac{360-125}{125}$

D $\frac{360}{125}$

E $\frac{125}{360}$

19 **If the temperature at 8:00 A.M. was 22°F, and at 4:00 P.M. the same day, it was −2°F, what was the average temperature decrease per hour during this period?**

A 2°F
B 2.5°F
C 3°F
D 5°F
E 6°F

20 **Each month a lawn-care company sprays for weeds in 500 different yards. Last month, to determine the effectiveness of its herbicide, the company randomly selected 50 lawns for inspection. Of the lawns selected, 40 showed 5 or fewer weeds. Which of the following could the lawn company conclude with the greatest certainty?**

A Exactly 80% of the lawns sprayed last month have 5 or fewer weeds.
B At least 80% of the lawns sprayed last month have exactly 5 weeds.
C More than 80% of the lawns sprayed last month have 5 or more weeds.
D It is very likely that more than half of the lawns sprayed last month have 5 or fewer weeds.
E It is very likely that more than half of the lawns sprayed last month have at least 5 weeds.

21 **Which of the following correctly expresses x yards, y feet, and z inches in terms of inches?**

A $36x + 12y + z$
B $x + 12y + 36z$
C $36x + 36y + z$
D $x + 36y + 36z$
E $x + 36y + 12z$

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22 **A fence encloses a rectangular field measuring 300 feet by 100 feet. A cow is tied to a fence post at one corner of the field. If the rope is 50 feet long, which of the following represents the grazing area of the cow inside the fence in square feet?**

Area of a circle = $\pi(\text{radius})^2$
Area of a rectangle = length times width

A 300×100

B $(300-50)\times(100-50)$

C $\dfrac{\pi \times 50 \times 50}{4}$

D $\dfrac{\pi \times 50 \times 50}{2}$

E $(300 \times 100) - (50 \times 50)\pi$

23 **The unit of measurement used to describe the energy produced by an atomic particle accelerator is the electron volt (eV). Shown below are the amounts of energy produced by two versions of a particle accelerator.**

Original Model	2×10^{10} eV
New Model	8×10^{11} eV

How many more electron volts are produced by the new model as compared with the original model?

A 7.8×10^{11}

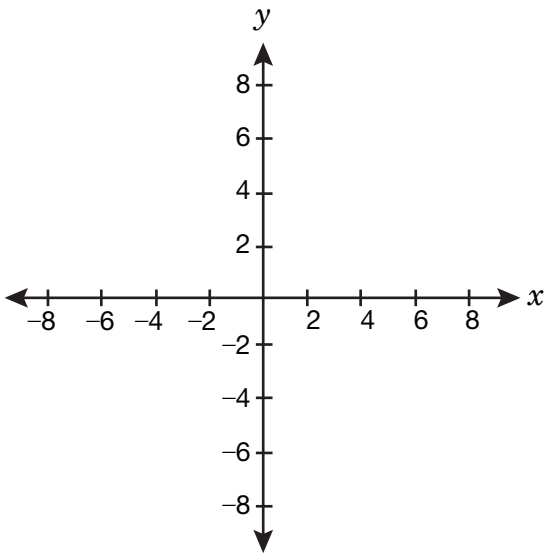
B 7.8×10^{10}

C 7.8×10^{9}

D 6×10^{1}

E 4×10^{1}

24 **The diagram below shows a coordinate grid. What are the coordinates of the point where the graph of $y = -4x + 8$ intersects the x-axis?**



A (2,0)

B (8,0)

C (0,–2)

D (0,–4)

E (0,4)

25 **Kyle purchased a padlock with a resettable combination that uses 3 digits from 0 through 9 that must be entered in the proper order. A digit may be repeated in the combination. Which expression shows the total number of possible combinations for the padlock?**

A 3^{10}

B 10^{3}

C $10 + 9 + 8$

D $(10)(9)(8)$

E $10 + 10 + 10$

Mathematics Practice Test
Answer Key

Question Number	Correct Answer
1	A
2	C
3	D
4	C
5	B
6	B
7	D
8	B
9	E
10	E
11	C
12	E
13	A
14	C
15	B
16	D
17	A
18	E
19	C
20	D
21	A
22	C
23	A
24	A
25	B

Solutions

1. **A** Cash vs. Credit

$500 $200 + 5($70)

$200 + $350

$550

$550 - $500 = $50

2. **C** Method #1: The salt content of the solution yields a 2:1 ratio. Meaning that the salt is double what the water content is. Read through the answer choices to find where the salt is double the water.

Method #2: Set up each answer choice into a proportion and solve. Definition of a proportion: cross products are equal.

a. $\frac{2grams}{1liters} = \frac{\frac{1}{2}grams}{2liters}$ $4 \neq \frac{1}{2}$

b. $\frac{2grams}{1liters} = \frac{\frac{1}{2}grams}{\frac{1}{2}liters}$ $1 \neq \frac{1}{2}$

c. $\frac{2grams}{1liters} = \frac{1grams}{\frac{1}{2}liters}$ $1 = 1$

d. $\frac{2grams}{1liters} = \frac{1grams}{2liters}$ $4 \neq 1$

e. $\frac{2grams}{1liters} = \frac{2grams}{\frac{1}{2}liters}$ $1 \neq 2$

3. **D** Price = (actual cost) + (25% of actual cost)

Price = 800 + (.25)(800)

Price = 800 + 200

Price = $1000

4. **C** Find the value along the y-axis(vertical axis)

The answer choices are expanded while the values along the y-axis(vertical axis) are shortened and written as decimal numbers(they have been divided by 1,000,000).

Expand each of the values:

0.5 × 1,000,000 = 500,000

0.6 × 1,000,000 = 600,000

0.7 × 1,000,000 = 700,000

0.8 × 1,000,000 = 800,000

The years lie along the x-axis(horizontal axis) and are in increments of 1 year. Matching year number 9 and finding the data plan falls between 0.7 and 0.8 the estimation is 0.75.

0.75 × 1,000,000 = 750,000

5. **B** $y = mx + b$ $m = slope$ $b = y - intercept$

$y = -1.2\ x = 4$ $m = -1.2$

Negative slope: line heads up into Quadrant II and down into Quadrant IV.

Line R shows negative slope

6. **B** Find the volume of the pool.

$$V = length\ X\ width\ X\ height$$

$$V = (50)(20)(10)$$

$$V = 10{,}000\ ft^3$$

Convert from feet to meters: use the given ratio (3.3ft = 1 m) and a proportion.

$$\frac{3.3\ ft}{1\ m} = \frac{10{,}000\ ft}{x\ m}$$

Cross multiply and solve for x. 10,000(1) = 3.3x

10,000 ÷ 3.3 = x

3,030 m^3 ~ 3,000 m^3 (approximate)

7. **D** The pool is in the shape of a rectangle.

Formula for the area of a rectangle is $A = lw$.

Method #1: Whole Area - Area of Pool = Space around the Pool

[(70)(30)] - [(50)(20)] = Space around the Pool

Knowing that each box of tiles covers 10 square meters then dividing 10 into [(70)(30)] - [(50)(20)] will yield the number of boxes needed.

Method #2: Calculate the Space around the Pool: 2100 – 1000 = 1100

Divide that space by 10(which is how much area 1 box of tiles covers) to find the number of boxes needed. 1100 ÷ 10 = 110 boxes

Use calculator and order of operations to calculate each answer choice and then match answers.

a. 210
b. 21,000
c. 100

d. 110
e. 11,000

8. **B** Method #1

Step 1: Convert the width of the pool into feet: Set up a proportion using the given ratio and the width of the pool.

$$\frac{ft}{1\,m} = \frac{x}{20m}$$ Solve: 20(3.3) ÷ 1 = 66 feet

Step 2: Divide the width of the pool by the width of each lane: 66 ÷ 8 = 8.25

Step 3: Calculate each answer choice using calculator and order of operation.2.25

a. 8.25
b. 0.75
c. 1.89
d. 20.625

Method #2

Step 1: Convert the width of the pool (which is where the lanes will begin and end) from meters to feet – Multiply 20 × 3.3

Step 2: Each lane must be 8ft wide so divide the product above by 8.

(20 × 3.3) ÷ 8

9. **E** Set up a proportion:

$$\frac{1.5\,kg}{1\,million\ liters} = \frac{x\,kg}{2.5\,million\ liters}$$

Solve for *x*: (1.5 × 2.5) ÷ 1 = 3.75 *million liters.*

10. **E** Set up and solve the expression and find an amount, then use calculator and the order of operations to calculate each one of the answer choices and match the amounts.
(75,000 – 35,000 – 2,000) ÷ 20
38,000 ÷ 20 = 1,900
a. 38,000
b. 3,650
c. .000526
d. 3,750

e. 1,900

11. **C** Set up a proportion and solve

Length $\frac{1in}{5m} = \frac{xin}{70m}$ **Width** $\frac{1in}{5m} = \frac{xin}{30m}$

(70 ×1) ÷5 = 14 in (30 × 1) ÷ 5 = 6in

14in ×6in

12. **E** Rate is constant

Assign a value for *r*, *d*, and *t* making a true statement

$20 = \frac{100}{5}$

A. $20 \neq \frac{120}{5}$

B. $20 \neq \frac{100}{4}$

C. $20 \neq \frac{120}{4}$

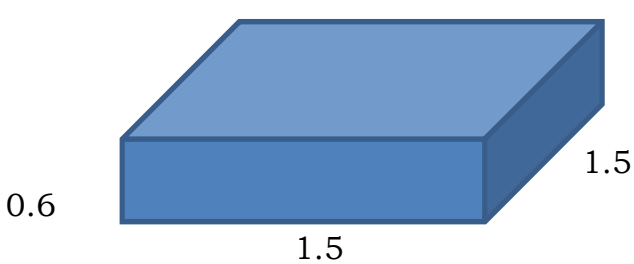
D. $20 \neq \frac{80}{10}$

E. $20 = \frac{80}{4}$

13. **A** Solve a 2-step equation

Isolate the variable term by adding the constant 3 to both sides of the equation $2x - 3 + 3 = 4 + 3$

14. **C** Draw a picture of the tank:



Volume of Rectangular Prism

V = (length)(width)(height)

V =(1.5)(0.6)(1.5)

Remember: *The Commutative Property of Multiplication allows for the order of the factors to be moved around.*

A Horizontal Histogram is a visual display used to compare amounts of different characteristics of data. It compares groups of data and makes generalizations about data quickly. A histogram represents the range of data in a continuous manner.

Graph Title: Percentage of Earth's Crustal Surface at Various Elevations
Axes & Labels:
(Vertical Axis) Data Group Axis – Gives a range of values of elevation levels
(Horizontal Axis) Amount or Frequency of Data Group – represents how much of the earth's surface is at a certain level above, at, or below sea level.

15. **B** There are 5 bars above the horizontal axis. Each bar represents a percentage of
the earth's crust at or above sea level. Read the percentage for each bar and find the total percentage amount.

From	0 m – 1000m	21%
	1000m – 2000m	4%
	2000m – 3000m	3%
	3000m – 4000m	2%
	4000m – 5000m	1%
	Total	31% about 30%

16. **D** To find the highest percentage of the Earth's crustal surface look for the longest bar or the bar with the highest percentage. The answer choices are set up in intervals from the smallest elevation to the highest elevation. The interval from -5000m to -4000m reads about 23%.

17. **A** Step 1: Take the highest elevation and subtract the lowest elevation
5000 - (-7000) = 5000 + 7000 = 12,000
Step 2: Convert from meters to kilometers
$\frac{1000m}{1\ km} = \frac{12000m}{x\ km}$ 12000 ÷ 1000 = 12 km

18. **E** Arc measure of a circle is the measure of the central angle.
Degree measure of a full circle is 360°

$$\frac{Part}{Whole} = \frac{Arc\ measure\ of\ Pacific\ Ocean}{All\ Land\ \&\ Water\ Areas\ on\ Earth} = \frac{125°}{360°}$$

19. **C** Degree difference: 22—2 = 22 + 2 = 24
Number of hours: 8
To find the average temperature decrease, divide the degree difference by the number of hours: 24 ÷ 8 = 3
Temperature decreased 3°/hour.

20. **D** Logic Definitions
A. Exactly means only 80%. It cannot be any other value.
B. At Least means 80 % or more.

C. More than means bigger than 80 %.
D. Is very likely It is conceivable that the statement can occur. Fewer means not as much
E. Is very likely—at least 5 or more.

21. **A** Standard(Customary) Measurement Conversion: **Length**

$12\ in = 1\ ft$ $36in = 3\ ft = 1\ yd$

x yards	*y feet*	*z inches*
How many inches in a yard?	How many inches in a foot?	Unit measure
$36in = 3\ ft = 1\ yd$	$12\ in = 1\ ft$	*1 inch*
$36\ x$	$12\ y$	$1\ z$

$36x + 12y + 1z$

22. **C** Find ¼ of the area of a circle

Both formulas Area of circle and Area of rectangle are given.

radius of circle = 50

Area of circle = π(50)(50)

The rope is tied to the corner of the rectangle so the grazing area only covers $\frac{1}{4}$ of the circle. Take the area of the circle and divide by 4.

$$\frac{\pi(50)(50)}{4}$$

23. **A** Subtract Scientific Notation:

Without Calculator:

How many more means to subtract. The New Model 8 X 10^{11} – The Original Model 2 X 10^{10}.

Part 1: Get the powers of 10 raised to the same exponent. Change the smaller power to a bigger power. Work with the Original Model 2 X 10^{10}.

Step 1: divide 2 by a factor of 10(move the decimal one place to the left)

$2 \div 10 = 0.2$

Step 2: multiply the power 10^{10} by 10^{1} (Rule: when the bases are the same and the operation is multiplication- **add** the exponents)

$$10^{10} \times 10^{1} = 10^{10+1} = 10^{11}$$

Step 3: Put the two parts together:

0.2 X 10^{11}

Part 2: Remember 2 X 10^{10} = 0.2 X 10^{11} (values are the exact same)
Since the powers of 10 are the same subtract the numerals

8 – 0.2 = 7.8

Part 3: Rewrite the number in scientific notation:

7.8 X 10^{11}

24. **A** Find the x-intercept given the equation $y = -4x + 8$

Step 1: an x-intercept is where the graph of the line intersects the x-axis(horizontal axis)

Step 2: On the x-axis ALL y values are equal to zero.

Step 3: Substitute zero in for y and solve for x.

$$0 = -4x + 8$$
$$0 - 8 = -4x + 8 - 8$$
$$-8 = -4x$$
$$-8 \div -4 = -4x \div -4$$
$$2 = x$$
$$\therefore (2,0) is\ x - intercept$$

25. **B** Permutation with Repetition: in the combination lock there are 10 numbers to choose from (0,1,…,9) and there are 3 three spots to put them in. Each time a new number is chosen for the combination the choices can be from all 10 digits…

10 × 10 × …(3 times) = 10^3 = 1,000

Mathematics

Time—45 minutes

25 Questions

1. The area of a country is approximately 104,896 square miles. If 12 percent of the land is reserved for national parks, which of the following expressions would give the best approximation of the area of the national parks in square miles?

   A. $100{,}000 \times 0.10$
   B. $100{,}000 \div 0.10$
   C. $100{,}000 \times 0.20$
   D. $200{,}000 \times 0.10$
   E. $200{,}000 \div 0.10$

2. The temperature in a city was expected to decline overnight at a rate of 2 degrees Celsius per hour. If this prediction was correct and the temperature was 8 degrees Celsius at 10:00 P.M., what was the temperature (in degrees Celsius) at 5:00 A.M. the next morning?

   A. 1
   B. −2
   C. −6
   D. −14
   E. −22

3. Computer salespeople at a local store earn a $100 commission per computer for the first 5 computers they sell each month. For every additional computer they sell during that month, the commission per computer is 1.5 times the rate for the first five. Which of the following is the total commission earned by a salesperson who sells 8 computers in a month?

   A. $190
   B. $800
   C. $950
   D. $1,050
   E. $1,200

4. A jogger runs an average of 8 miles per week. At this rate, about how many miles will the jogger run in the next 3½ weeks?

   A. 24
   B. 28
   C. 30
   D. 32
   E. 48

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5. On a road map, the distance between two cities is 5.1 inches. If 1.8 inches on the map represents 40 miles of actual distance, which of the following expressions gives the best estimate of the actual distance in miles between these cities?

A. $\frac{5}{2} \times 40$

B. $\frac{6}{1} \times 40$

C. $\frac{6}{40} \times 2$

D. $\frac{5}{1} \times 40$

E. $\frac{5}{40} \times 2$

6. A frozen yogurt store advertises 22 flavors of yogurt, 3 types of cones, and 10 candy toppings. Which of the following expressions represents the number of different combinations of flavors, cones, and toppings available?

A. $22+3+10$

B. $(22+3)(10)$

C. $(3+10)(22)$

D. $(22+10)(3)$

E. $22 \times 3 \times 10$

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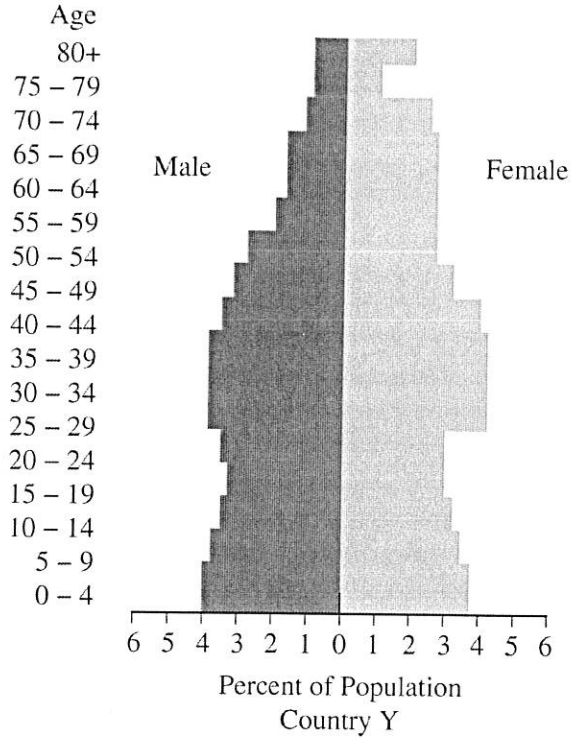
Questions 7 and 8 refer to the information below.

The graph below shows percentages of males and females at different age levels in Country Y.



7. Which of the following is the best estimate of the percent of this country's male and female population that is between 25 and 29 ?

A. 4
B. 6
C. 8
D. 10
E. 12

8. If the total population of the country is 10,000,000, which of the following expressions gives the best approximation of the number of females and males who are 80 years of age or older?

A. $\frac{1}{2} \times 10{,}000{,}000$

B. $\frac{10{,}000{,}000}{0.01} - \frac{10{,}000{,}000}{0.02}$

C. $0.02 \times 10{,}000{,}000$

D. $0.01 \times 10{,}000{,}000$

E. $0.03 \times 10{,}000{,}000$

---

9. The odometer on the Chens' car read 32,302 when their trip began and 32,667 when it ended. Eleven gallons of gasoline were used. Which of the following expressions represents the number of miles per gallon obtained on this trip?

A. $\frac{32{,}667 - 32{,}302}{11}$

B. $\frac{32{,}667 + 32{,}302}{11}$

C. $\frac{32{,}302}{32{,}667} \times 11$

D. $(32{,}667 - 32{,}302) \times 11$

E. $(11 \times 32{,}667) - 32{,}302$

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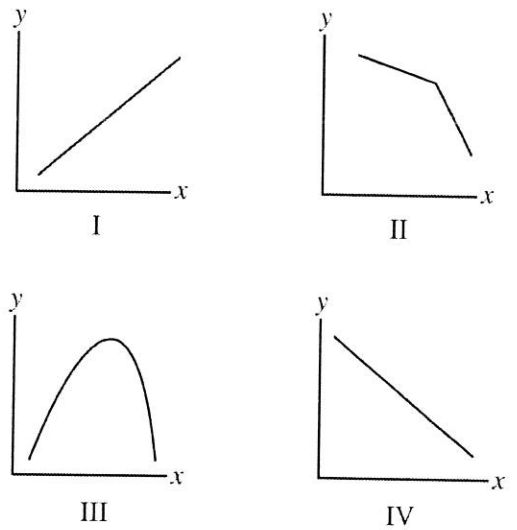
10. A 12-issue subscription to a magazine costs \$24. If each issue purchased individually costs \$3, how much is saved in a year by ordering a 12-issue subscription rather than purchasing each issue individually?

A. \$6
B. \$8
C. \$10
D. \$12
E. \$16

11. The temperature on the planet Mars ranges from $-150°C$ to $25°C$. By how many degrees Celsius do these two temperatures differ?

A. 25
B. 50
C. 125
D. 150
E. 175

12. Which graph could represent the relationship between X and Y, if it is known that Y always decreases as X increases?



A. I only
B. IV only
C. I and IV only
D. II and III only
E. II and IV only

13. The area of a country is 192,206 square miles. If farmland makes up 33 percent of the country, which of the following is the best approximation of the area of the farmland in square miles?

A. $200,000 \times 0.30$
B. $200,000 \div 0.30$
C. $100,000 \times 0.30$
D. $100,000 \div 0.30$
E. $100,000 \times 0.40$

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14. For which of the quantities below is it more reasonable to estimate the quantity by gathering data from a sample rather than from the whole population?

I. The percentage of adults in a large city who favor a sales tax increase
II. The average amount spent for prom night by high school seniors in a state
III. The number of teachers in a high school who are enrolled in graduate classes

A. I only
B. II only
C. III only
D. II and III only
E. I and II only

15. Consider the rates for 3 campgrounds shown below:

Campground X First night: $20.00 Each additional night: $5.00

Campground Y First night: $30.00 Each additional night: $2.50

Campground Z $15.00 per night

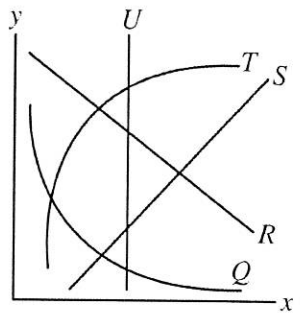
A family wants to stay at a campground for 3 nights. At which campground(s) will their total cost be the least?

A. Campground X
B. Campground Y
C. Campground Z
D. Either campground X or Z
E. Either campground Y or Z

16. Which statement represents an inaccurate use of percent?

A. The interest rate has risen to 16.5%.
B. Of all the animals in the zoo, 24.871% are from Africa.
C. Home sales increased by 110% from May to June.
D. There was a 0.01% decrease in rainfall this year compared with last year.
E. There are now 115% fewer parrots in the wild than there were 10 years ago.

17. Consider the graphs below.



Although the numbers are not included on either axis, it is possible to determine from shape and location that the equation $Y = -1.3X + 2$ corresponds to graph

A. Q.
B. R.
C. S.
D. T.
E. U.

18. Consider the equation $7x + 5 = 12$. To solve this equation for x, what would be the most logical first step?

A. Add 5 to both sides of the equation.
B. Subtract 5 from both sides of the equation.
C. Divide both sides of the equation by -7.
D. Multiply both sides of the equation by 7.
E. Subtract 12 from both sides of the equation.

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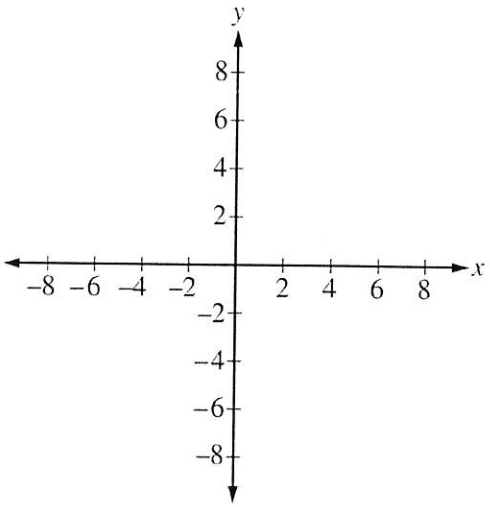
19. Which of the following correctly expresses x quarts, y pints, and z ounces in terms of ounces?

A. $x+16y+32z$
B. $32x+16y+z$
C. $32x+32y+z$
D. $8x+4y+2z$
E. $x+32y+16z$

20. The diagram below shows a coordinate grid. What are the coordinates of the point where the graph of $y=-3x+9$ intersects the x-axis?



A. (9,0)
B. (3,0)
C. (0,−3)
D. (0,−9)
E. (6,0)

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Questions 21 and 22 refer to the information below.

JUNE						
Sun	Mon	Tue	Wed	Thur	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

21. A date is selected at random from the month of June as shown in the calendar above. What is the probability that the date selected will be a Thursday or Friday?

A. $\frac{1}{30}$

B. $\frac{2}{30}$

C. $\frac{4}{30}$

D. $\frac{8}{30}$

E. $\frac{16}{30}$

22. A date is selected at random from the month of June as shown in the calendar above. What is the probability that the date selected will be a Friday <u>and</u> an odd number?

A. $\frac{1}{30}$

B. $\frac{2}{30}$

C. $\frac{4}{30}$

D. $\frac{25}{30}$

E. $\frac{29}{30}$

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23. Starting with \$20 and spending twice as much as she intended to spend, Sara is left with \$1.60. Which of the following is the best estimate of how much Sara intended to spend?

A. \$18
B. \$14
C. \$9
D. \$6
E. \$4

24. Ms. Riley had to stay in the hospital for 3 days at a cost of \$600 per day. Under her health insurance policy, she must pay the first \$500 and 10 percent of the remaining cost. How much must she pay for this hospital stay?

A. \$430
B. \$500
C. \$630
D. \$4,300
E. \$4,800

25. What is the slope of a line perpendicular to the line given by $4y = 12x$?

A. $\frac{1}{12}$

B. $\frac{1}{48}$

C. $-\frac{1}{12}$

D. $-\frac{1}{4}$

E. $-\frac{1}{3}$

STOP

Solutions

1. **A** Step 1:Round the area of the country off to the nearest hundred thousand: 104,896 rounds to 100,000
Step 2: Round the percent off to the nearest ten: 12% rounds to 10%
Step 3: Change the percent to a decimal 10% ÷ by 100 = 0.10
Step 4: Multiply the area of the country by the percent: 100,000 × 0.10

2. **C** Step 1: Find the total number of hours 10pm to 12am = 2hrs
12 am to 5am = 5hrs
Total hours = 7hrs
Step 2: Multiply number of hours by temperature decline yielding total
(7 hours)(-2°C) = -14°C

Step3: Subtract original temperature by the total decline
8°C – 14°C = -6°C

3. **C** 8 computers were sold: 5 with a commission rate of $100 each and 3 with a commission rate of $150.
Step1: Multiply 5 × $100 = $500
Step 2: Multiply 3 × $150 = $450
Step 3: Add $500 + $450 = $950

4. **B** Formula for distance: D = r × t
D = 8 × 3.5
D = 28

5. **A** Round each decimal value to the nearest whole number: 5.1 to 5
1.8 to 2

Set up a proportion: $\frac{map}{actual} = \frac{2inches}{40miles} = \frac{5inches}{X\ miles}$

Solve for *x:* 5 × 40 ÷ 2 = 100

Calculate each answer choice to find which one equals 100
a. 2.5 × 40 = 100
b. 6 × 40 = 240
c. 0.15 × 2 = 0.30
d. 5 × 40 = 200
e. 0.125 × 2 = 0.25

6. **E** **Remember:** The Basic or Fundamental Counting Principle can be used to determine the possible out comes when there are two or more characteristics. To determine the number of possible outcomes multiply the number of possibilities of the first characteristic by the number of possibilities of the second and so on….
22 flavors × 3 cones × 10 toppings: 22 × 3 × 10

A <u>Double-Sided Horizontal Histogram</u> is a visual display used to compare amounts of different characteristics of data. It compares groups of data and makes generalizations about data quickly. A histogram represents the range of data in a continuous manner.

Graph Title: Percentages of Males & Females at Different Age Levels

Axes & Labels:
(Vertical Axis) Age – Gives the range of ages from 0 to 80+
(Horizontal Axis) Percent of Population in County Y – Gives a range of percentage values from 0 to 6 continuously.
Dark vs Light Shading – Male representations is on the left (dark shading)
Female representation is on the right (light shading)

7. **C** On the graph locate the age range between 25 and 29.
From the center (0) read percentages for male population (Right to Left): 4%
From the center (0) read percentages for female population (Left to Right): 4.5%
Add the two values together and round to nearest whole number: 8.5% ~ 8%

8. **E** Step 1: Find total population percentage for top age level(male & female): 3.5%
Step 2: Round the percentage to the nearest whole number. 3.5% ~ 3%
Step 3: Convert from a percent to a decimal: 3% 3 ÷ 100 = 0.03
Step 4: Multiply: 0.03 × 10,000,000

9. **A** Miles per Gallon: the word per is another word for division.
Step 1: Find the total miles travelled: 32,667 – 32,302
Step 2: Divide the total miles by the number of gallons used: $\frac{32{,}667-32{,}302}{11}$

10. **D** Method 1:
Step 1: Find the total cost for 12 months when the cost of the magazine is $3 per issue. 12 × $3 = $36
Step 2: Find the difference in the two yearly costs: $36 - $24 = $12
Method 2:
Step 1: Find the cost per issue when the yearly cost is $24: $24 ÷ 12 = $2
Step 2: Subtract the costs per issue: $3 - $2 = $1
Step 3: Multiply $1 × 12 = $12

11. **E** Subtract the largest value from the lowest value:
25°C – (-150°C) = 25°C + 150°C = 175°C

12. **E** Each graph is drawn in Quadrant I, which makes the axes positive:
Assign values to both the x and y axes. (Ex. 0 to 5)
Plot points on each graph
For each graph as X get larger what is happening to Y.
In graph II and IV: X get larger and Y gets smaller.

13. **A** Step 1:Round the area of the country off to the nearest hundred thousand: 192,206 rounds to 200,000
Step 2: Round the percent off to the nearest ten: 33% rounds to 30%
Step 3: Change the percent to a decimal 30% ÷ by 100 = 0.30
Step 4: Multiply the area of the country by the percent: 200,000 × 0.30

14. **E** Step 1: Define the terms **POPULATION** and **SAMPLE**.
POPULATION: includes all objects of a defined group.
SAMPLE: A part or portion of the population

Ask this question for each of the choices:
Is it practical to collect data from the entire population?

If the answer is **NO** then use a sample.....

I. **NO**: Cannot talk to all Adults in the whole city.
II. **NO**: Cannot talk to all Seniors in the state.
III. **YES**: Can talk with all teachers in a particular High School.

15. **A** Find the total amount for all 3 nights and chose the value that is the smallest number.

	Campground X	Campground Y	Campground Z
1st Night	$20	$30	$15
2nd Night	$5	$2.50	$15
3rd Night	$5	$2.50	$15
Total	$30	$35	$45

Campground X is the least expensive.

16. **E** Go through each answer choice and see if it makes sense.
Cannot have more than 100% fewer of something b/c 100% fewer is zero.

17. **B** **Function Information**: The graphic shows the functions in the Quadrant I, so both x and y axes are positive.
Equation Information: The equation is in the slope-intercept form: y = mx +b.
M in this form represents the slope of the line. The slope in the example is -1.3.

When the slope of a linear function is:
positive: as the x values increase the y values increase
negative: as the x values increase the y values decrease
zero: as the x values increase the y values stay the same
undefined: as the y values increase the x values stay the same

Here is a Funny Face Guy for guidance:

Positive **/+** **-** Negative

Vertical (Undefined) **|**
U

Horizontal (Zero) **O_____O**

18. **B** When solving a one-variable linear equation the goal is to isolate the variable; get the variable alone and positive.
The first step is to either add/subtract the constant value from both sides of the equation.
Identify the operation on the constant and perform the opposite operation.

Ex: $7x + 5 = 12$ +5 is the constant Must subtract 5 to isolate the $7x$.

19. **B** Standard(Customary) Measurement Conversion: **Liquid Volume**

8 ounce(oz) = 1 cup *16oz = 2 cups = 1 pint* *32oz = 4 cups = 2 pints = 1 quart*

x quarts	*y pints*	*z ounces*
How many ounces in a quart?	How many ounces in a pint?	Unit measure
32oz = 1 *quart*	16 oz = 1 *pint*	*1 ounce*
32 x	16 y	1 z

$32x + 16y + 1z$

20. **B** Use substitution to find the coordinate of the x-intercept.
The definition of an x-intercept: The point where the function lies on the x-axis, making that coordinate ALWAYS having a zero for the y-value of that coordinate.
Step 1: Substitute zero in for the y value in the equation.

$$0 = -3x + 9$$

Step 2: Solve for x:

$$3x = 9$$

$$\frac{3x}{3} = \frac{9}{3}$$

$$x = 3$$

Answer: (3, 0)

21. **D** **"OR" FORMULA: P(A or B) = P(A) + P(B) – P(A and B)**
Total days in June = 30
P(A)= Thursday: there are 4 Thursdays in the calendar: $\frac{4}{30}$
P(B) = Friday: there are 4 Fridays in the calendar$\frac{4}{30}$

P(A+B) = There are no days that are both Thursday AND Friday: $\frac{0}{30}$

$$P(A) + P(B) - P(A \text{ and } B) = \frac{4}{30} + \frac{4}{30} - \frac{0}{30} = \frac{8}{30}$$

22. **B** **"AND" FORMULA: P(A and B) =** $\dfrac{\textit{Number of outcomes in both A and B}}{\textit{Total number of outcomes}}$
Event A: 4 Fridays in the calendar
Event B: odd numbers on the calendar: 15
Total days in June: 30

There are only 2 Fridays that are odd numbered days: $\frac{2}{30}$

23. **C** \$20.00 – \$1.60 = \$18.40
\$18.40 ÷ 2 = \$9.20

24. **C** 3 days × \$600 = \$1800
\$1800 - \$500 = \$1300
\$1300 × 0.10 = \$130

$500 + $130 = $630

25. **E** Definition of **perpendicular lines**: Two lines intersecting at a right angle. For this to happen the slopes are negative reciprocals of one another.

Step 1: Find the slope of the given line. Put the given equation in the slope intercept form: $y = mx + b$
Divide both sides of equation by 4.

$$4y = 12x$$

$$\frac{4y}{4} = \frac{12x}{4}$$

$$y = 3x$$

Step 2: Reciprocal definition: Multiply the original number by reciprocal yields the value of 1.
Take slope: **3** find the reciprocal: $\frac{1}{3}$
Make the $\frac{1}{3}$ negative: $-\frac{1}{3}$