

**ACT Mid-TEST: 10<sup>th</sup> Graders**

Since there are 15 questions you get 20 minutes. Do your best! Place the CAPITAL LETTER in the box provided.



**MATHEMATICS TEST**

60 Minutes—60 Questions

**DIRECTIONS:** Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

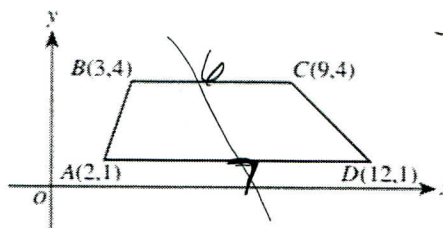
1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

Use the following information to answer the next 3 questions

Trapezoid ABCD is graphed in the standard (x, y) coordinate plane below.

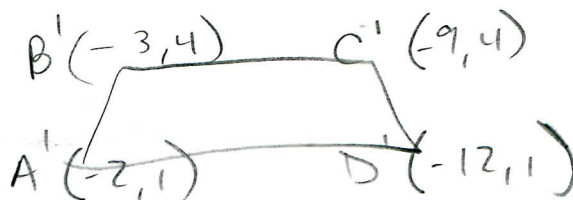
1. What is the slope of  $\overline{CD}$ ?

- B**
- A. -3
  - B. -1**
  - C. 1
  - D.  $\frac{5}{21}$
  - E.  $\frac{3}{2}$



2. When ABCE is reflected over the y-axis to A'B'C'D', what are the coordinates of D'?

- F**
- F. (-12, 1)**
  - G. (-12, -1)
  - H. (12, -1)
  - J. (1, 12)
  - K. (1, -12)



3. Which of the following vertical lines cuts ABCD into 2 trapezoids with equal areas?

**E**

- A.  $x = 2.5$
- B.  $x = 3.5$
- C.  $x = 4.5$
- D.  $x = 5.5$
- E.  $x = 6.5$



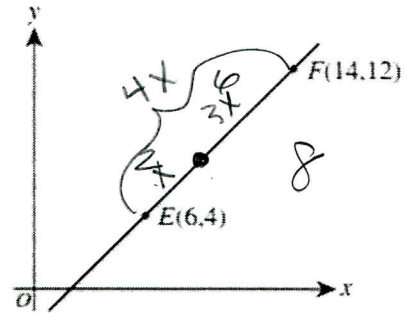
4. The points  $E(6, 4)$  and  $F(14, 12)$  lie in the standard  $(x, y)$  coordinate plane shown below. Point  $D$  lies on  $\overline{EF}$  between  $E$  and  $F$  such that the length of  $\overline{EF}$  is 4 times the length of  $\overline{DE}$ . What are the coordinates of  $D$ ?

**G**

- F.  $(7, 5)$
- G.  $(8, 6)$
- H.  $(8, 8)$
- J.  $(10, 8)$
- K.  $(12, 10)$

$$4x = 8$$

$$x = 2$$



5. A container is  $\frac{1}{8}$  full of water. After 10 cups of water are added, the container is  $\frac{3}{4}$  full. What is the volume of the container, in cups?

**D**

- A.  $13\frac{1}{3}$
- B.  $13\frac{1}{2}$
- C. 15
- D. 16
- E. 40

Handwritten work for Question 5:

$$\frac{1}{8} \text{ full} = \frac{12 + 4 \text{ cups}}{16 \text{ cups}} = \frac{16}{16} = 1$$

$$\frac{3}{4} \text{ full} = \frac{10 + x}{8} = \frac{3x}{4}$$

$$\frac{10 + x}{8} = \frac{3x}{4}$$

$$4(10 + x) = 8 \cdot \frac{3x}{4}$$

$$40 + 4x = 6x$$

$$40 = 2x$$

$$x = 20$$

Wait, the handwritten work shows a different path:

$$\frac{1}{8} \text{ full} = \frac{x}{16 \text{ cups}}$$

$$\frac{3}{4} \text{ full} = \frac{10 + x}{8}$$

$$\frac{x}{16} = \frac{10 + x}{8}$$

$$x = 2(10 + x)$$

$$x = 20 + 2x$$

$$-x = 20$$

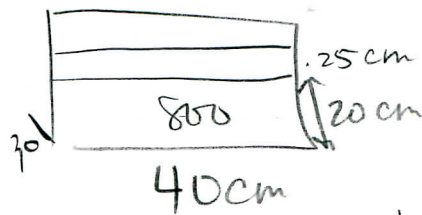
$$x = -20$$

There is a boxed answer  $x = 2$  and  $20x = 40$  written nearby.

6. You can find the volume of an irregularly shaped solid object by completely submerging it in water and calculating the volume of water the object displaces. You completely submerge a solid object in a rectangular tank that has a base 40 centimeters and is filled with water to a depth of 20 centimeters. The object sinks to the bottom, and the water level goes up 0.25 centimeters. What is the volume, in cubic centimeters, of the object?

**A**

- A. 300
- B. 240
- C. 200
- D. 150
- E. 75



Handwritten calculations for Question 6:

$$(40)(30)(20) = 24000$$

$$(40)(30)(20.25) = 24300$$

7. Kelly asked 120 students questions about skiing. The results of the poll are shown in the table below.

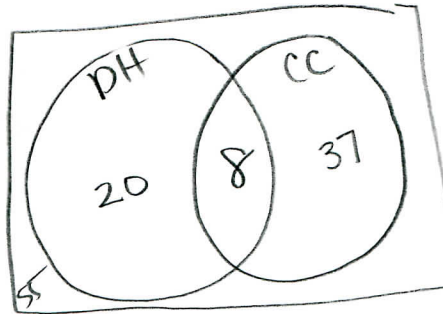
Question	Yes	No
1. Have you skied either cross-country or downhill?	65	55
2. If you answered Yes to Question 1, did you ski downhill?	28	37
3. If you answered Yes to Question 1, did you ski cross-country?	45	20

CC  
DH

After completing the poll, Kelly wondered how many of the students polled had skied both cross-country *and* downhill. How many of the students polled indicated that they had skied both cross-country and downhill?

K

- F. 73  
G. 65  
H. 47  
J. 18  
K. 8



$$65 - 37 - 20 = 8$$

8. As part of a probability experiment, Elliott is to answer 4 multiple-choice questions. For each question, there are 3 possible answers, only 1 of which is correct. If Elliott randomly and independently answers each question, what is the probability that he will answer the 4 questions correctly?

E

- A.  $\frac{27}{81}$   
B.  $\frac{12}{81}$   
C.  $\frac{4}{81}$   
D.  $\frac{3}{81}$   
E.  $\frac{1}{81}$

#1 #2 #3 #4

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right)\left(\frac{1}{3}\right) = \frac{1}{81}$$

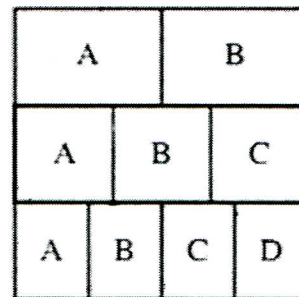
$\frac{1}{3}$  right  
 $\frac{2}{3}$  wrong

9. The square below is divided into 3 rows of equal area. In the top row, the region labeled A has the same area as the region labeled B. In the middle row, the 3 regions have equal areas. In the bottom row, the 4 regions have equal areas. What fraction of the square's area is in a region labeled A?

K

- F.  $\frac{1}{9}$   
G.  $\frac{3}{9}$   
H.  $\frac{6}{9}$   
J.  $\frac{13}{12}$   
K.  $\frac{13}{36}$

$$\frac{1}{6} + \frac{1}{9} + \frac{1}{12} = \frac{13}{36}$$



$$\left(\frac{1}{2}\right)\left(\frac{1}{3}\right) = \frac{1}{6}$$

$$\left(\frac{1}{3}\right)\left(\frac{1}{3}\right) = \frac{1}{9}$$

$$\left(\frac{1}{4}\right)\left(\frac{1}{3}\right) = \frac{1}{12}$$

10. To make a 750-piece jigsaw puzzle more challenging, a puzzle company includes 5 extra pieces in the box along with the 750 pieces, and those 5 extra pieces do not fit anywhere in the puzzle. If you buy such a puzzle box, break the seal on the box, and immediately select 1 piece at random, what is the probability that it will be 1 of the extra pieces?

**D**

- A.  $\frac{1}{5}$
- B.  $\frac{1}{755}$
- C.  $\frac{1}{750}$
- D.  $\frac{5}{755}$**
- E.  $\frac{5}{750}$

$$\frac{5 \text{ actual}}{755 \text{ total}}$$

11. Joelle earns her regular pay of \$7.50 per hour for up to 40 hours of work in a week. For each hour over 40 hours of work in a week, Joelle is paid  $1\frac{1}{2}$  times her regular pay. How much does Joelle earn for a week in which she works 42 hours?

**H**

- F. \$126.00
- G. \$315.00
- H. \$322.50**
- J. \$378.00
- K. \$472.50

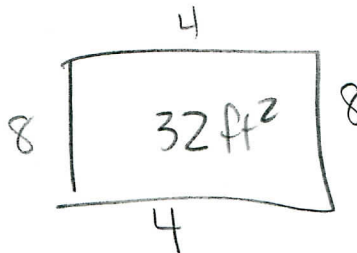
$$7.5x = 40$$

$$300 + 11.25(2) = 322.50$$

12. A rectangle has an area of 32 square feet and a perimeter of 24 feet. What is the shortest of the side lengths, in feet, of the rectangle?

**D**

- A. 1
- B. 2
- C. 3
- D. 4**
- E. 8

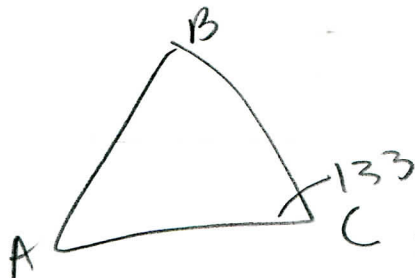


$$16 + 8 = 24$$

13. In  $\triangle ABC$ , the sum of the measures of  $\angle A$  and  $\angle B$  is  $47^\circ$ . What is the measure of  $\angle C$ ?

**J**

- F.  $47^\circ$
- G.  $86^\circ$
- H.  $94^\circ$
- J.  $133^\circ$**
- K.  $143^\circ$



$$180 - 47$$



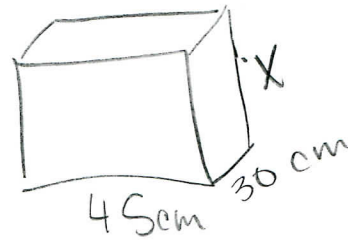
14. A function  $f(x)$  is defined as  $f(x) = -8x^2$ . What is  $f(-3)$ ?

- A. -72  
 B. 72  
 C. 192  
 D. -576  
 E. 576

$$f(-3) = -8(-3)^2 = -72$$

15. Hot Shot Electronics is designing a packing box for its new line of Acoustical Odyssey speakers. The box is a rectangular prism of length 45 centimeters, width 30 centimeters, and volume 81,000 cubic centimeters. What is the height, in centimeters, of the box?

- F. 75  
 G. 60  
 H. 48  
 J. 27  
 K. 18



$$81,000 = (45)(30)(x)$$
$$x = 60$$