

Key

ACT Post-TEST: 9th Graders

Since there are 25 questions you get 35 minutes. Do your best! Place the CAPITAL LETTER in the box provided.

2



2

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.

1. If $9(x - 9) = -11$, then $x = ?$

- A. $-\frac{92}{9}$
- B. $-\frac{20}{9}$
- C. $-\frac{11}{9}$
- D. $-\frac{2}{9}$
- E. $\frac{70}{9}$

PEMDAS → SADMEP

$$x - 9 = \frac{-11}{9}$$

$$+9 \quad +9$$

$$x = \frac{-11}{9} + \frac{81}{9} = \frac{70}{9}$$

2. What is the least common multiple of 70, 60, and 50?

- F. 60
- G. 180
- H. 210
- J. 2,100
- K. 210,000 Biggest

Divide into answer to check



3. Lines p and n lie in the standard (x, y) coordinate plane. An equation for line p is $y = 0.12x + 3,000$. The slope of line n is 0.1 greater than the slope of line p . What is the slope of line n ?

- A. 0.012
 B. 0.02
 C. 0.22
 D. 1.2
 E. 300

$$\begin{array}{r} p = .12 \\ + .1 \\ \hline .22 \end{array}$$

4. The inequality $6(x + 2) > 7(x - 5)$ is equivalent to which of the following inequalities?

- F. $x < -23$
 G. $x < 7$
 H. $x < 17$
 J. $x < 37$
 K. $x < 47$

PEMDAS

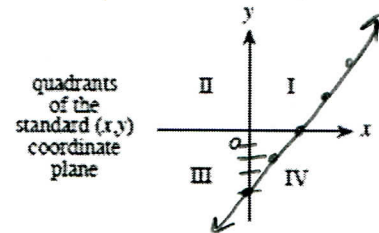
$$\begin{array}{r} 6x + 12 > 7x - 35 \\ -6x \quad -6x \\ \hline 12 > x - 35 \\ +35 \quad +35 \end{array}$$

$$\begin{array}{l} 47 > x \\ \text{OR} \\ x < 47 \end{array}$$

5. What are the quadrants of the standard (x, y) coordinate plane below that contain point on the graph of the equation $4x - 2y = 8$?

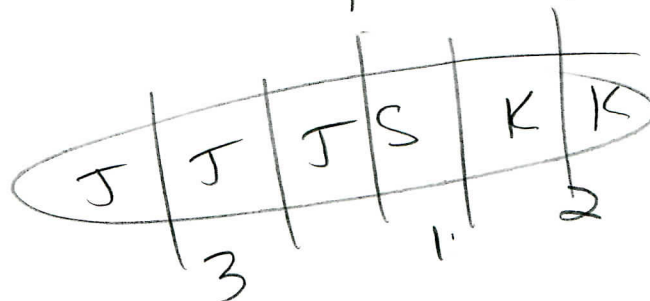
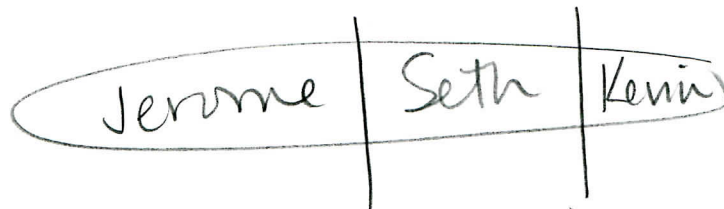
- A. I and III only
 B. I, II, and III only
 C. I, II, and IV only
 D. I, III, and IV only
 E. II, III, and IV only

$$y = 2x - 4$$



6. Jerome, Kevin, and Seth shared a submarine sandwich. Jerome ate $\frac{1}{2}$ of the sandwich, Kevin ate $\frac{1}{3}$ of the sandwich, and Seth ate the rest. What is the ratio of Jerome's share to Kevin's share to Seth's share?

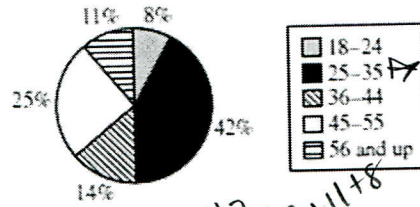
- F. 2:3:6
 G. 2:6:3
 H. 3:1:2
 J. 3:2:1
 K. 6:3:2



$$3:2:1$$

7. The circle graph below shows the distribution of registered voters, by age, for a community. Registered voters are randomly selected from this distribution to be called for jury duty. What are the odds (in the age range: not in the age range) that the first person called for jury duty is in the age range of 25 – 35 years?

Distribution of Registered Voters by Age



D

- A. 1:3
B. 7:8
C. 7:43
D. 21:29
E. 42:25

$$\frac{42:58}{2}$$

$$\boxed{21:29}$$

$$\frac{42}{14+25+11+8}$$

8. For what value of a would the following system of equations have an infinite number of solutions?

$$3(2x - y = 8)$$

$$6x - 3y = 4a$$

$$6x - 3y = 24$$

$$4a = 24$$

$$\boxed{a = 6}$$

G

- F. 2
G. 6
H. 8
J. 24
K. 32

9. In the equation $x^2 + mx + n = 0$, m and n are integers. The only possible value for x is -3 . What is the value of m ?

$$(-3)^2 + m(-3) + n = 0$$

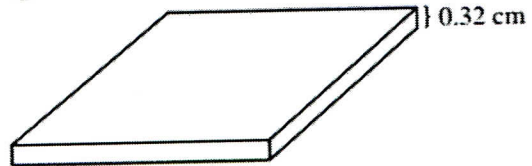
$$9 - 3m + n = 0$$

$$-3m + n = -9$$

C

- A. 3
B. -3
C. 6
D. -6
E. 9

10. A computer chip 0.32 cm thick is made up of layers of silicon. If the top and bottom layers are each 0.03 cm thick and the inner layers are each 0.02 cm thick, how many inner layers are there?



F

- F. 13
G. 15
H. 16
J. 52
K. 64

$$0.03(2) + 0.02x = .32$$

$$.06 + .02x = .32$$

$$.02x = .26$$

$$\boxed{x = 13}$$

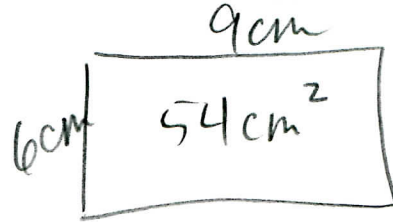
11. The length of a rectangle with area 54 square centimeters is 9 centimeters. What is the perimeter of the rectangle, in centimeters?

- A. 6
 B. 12
 C. 15
 D. 24
 E. 30

$$6(2) + 9(2)$$

$$12 + 18$$

$$\boxed{30}$$



12. This month, Kami sold 70 figurines in 2 sizes. The large figurines sold for \$12 each, and the small figurines sold for \$8 each. The amount of money he received from the sales of the large figurines was equal to the amount of money he received from the sales of the small figurines. How many large figurines did Kami sell this month?

- A. 20
 B. 28
 C. 35
 D. 42
 E. 50

$$8y = 12x$$

$$y = \frac{12}{8}x$$

$$x + y = 70$$

$$12x + 8y = 728$$

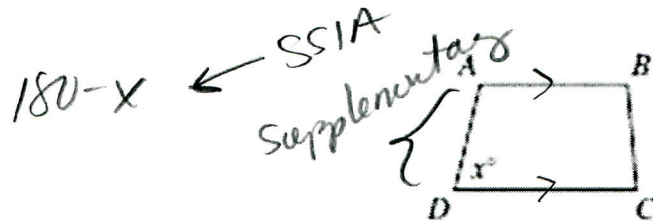
$$\frac{8}{8}x + \frac{12}{8}(x) = 70$$

$$\frac{20}{8}x = 70$$

$$\frac{20x = 560}{20} \quad x = 28$$

13. For trapezoid ABCD shown below, $\overline{AB} \parallel \overline{DC}$, the measures of the interior angles are distinct, and the measure of $\angle D$ is x° . What is the degree measure of $\angle A$ in terms of x ?

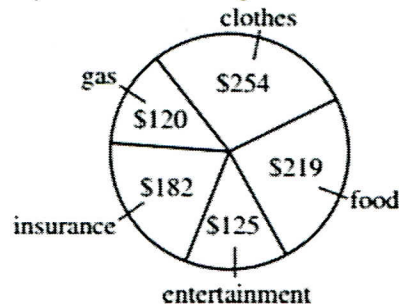
- F. $(180 - x)^\circ$
 G. $(180 - 0.5x)^\circ$
 H. $(180 + 0.5x)^\circ$
 J. $(180 + x)^\circ$
 K. x°



14. Last month, Lucie had total expenditures of \$900. The pie chart below breaks down these expenditures by category. The category in which Lucie's expenditures were greatest is what percent of her total expenditures, to the nearest 1%?

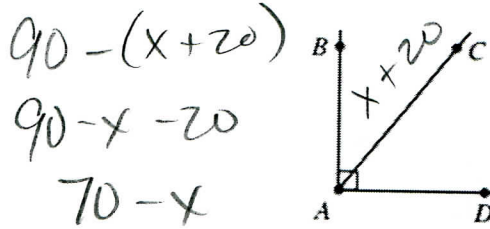
- A. 24%
 B. 28%
 C. 32%
 D. 34%
 E. 39%

$$\frac{254}{900} \approx .282$$



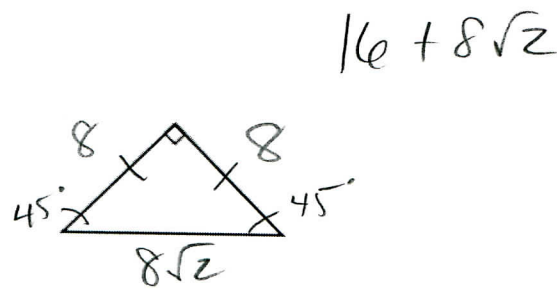
15. In the figure shown below, the measure of $\angle BAC$ is $(x + 20)^\circ$ and the measure of $\angle BAD$ is 90° .
What is the measure of $\angle CAD$?

- F. $(x - 70)^\circ$
 G. $(70 - x)^\circ$
 H. $(70 + x)^\circ$
 J. $(160 - x)^\circ$
 K. $(160 + x)^\circ$

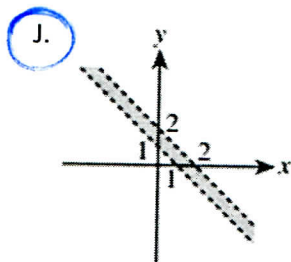
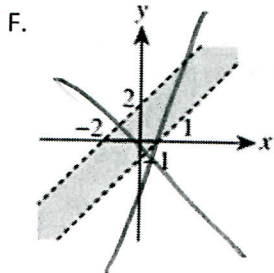


16. What is the perimeter, in inches, of the isosceles right triangle shown below, whose hypotenuse is $8\sqrt{2}$ inches long?

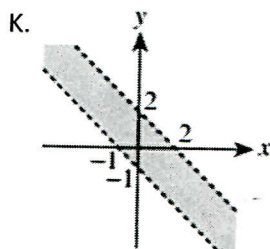
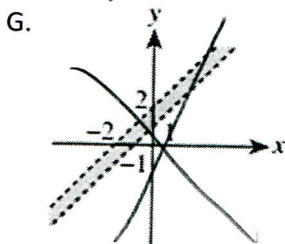
- A. 8
 B. $8 + 8\sqrt{2}$
 C. $8 + 16\sqrt{2}$
 D. 16
 E. $16 + 8\sqrt{2}$



17. Which of the following is the graph of the region $1 < x + y < 2$ in the standard (x, y) coordinate plane?

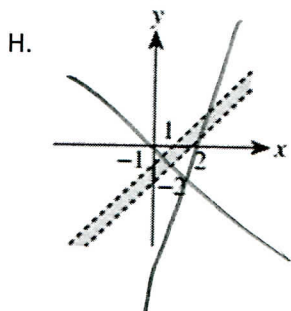


$1 < x + y$
 $1 - x < y$ dashed above



$x + y < 2$
 $y < -x + 2$ dashed below

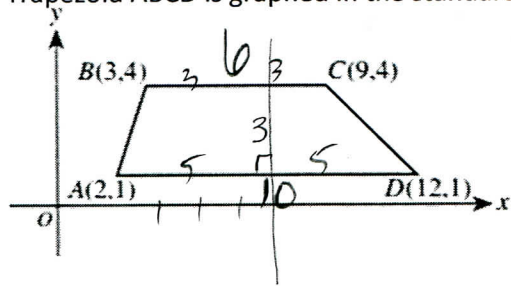
J



Negative slopes

Use the following information to answer the next 3 questions

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



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

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

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 - 4}{12 - 9} = \frac{-3}{3} = -1$$

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

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

$$\begin{array}{l} x \rightarrow -x \\ y \rightarrow y \end{array} \quad \begin{array}{l} 12 \rightarrow -12 \\ 1 \rightarrow 1 \end{array}$$

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

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

$$\frac{1}{2}(b_1 + b_2)(h)$$

$$\frac{1}{2}(\quad)(3)$$

21. 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)

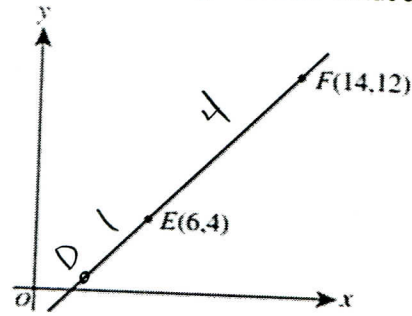
$$d = \sqrt{(6-14)^2 + (4-12)^2}$$

$$= \sqrt{(-8)^2 + (-8)^2}$$

$$= \sqrt{64 + 64}$$

$$= \sqrt{128}$$

$$\frac{1}{4} = \frac{x}{\sqrt{128}} \quad x \approx 2.82$$



22. 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

$12 + 4 = 16 \text{ cups}$

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

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

$\frac{1}{8} = \frac{3}{4} \cdot \frac{1}{10+x}$

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

$20x = 40$

$x = 2$

$\frac{1}{4} = 4 \text{ cups}$

$\frac{3}{4} = \frac{1}{4} \Rightarrow \frac{3x}{4} = 3 \Rightarrow x = 4$

23. 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?

- F**
- F. 300**
 - G. 240
 - H. 200
 - J. 150
 - K. 75



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

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

$24300 - 24000 = 300$ difference cm

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

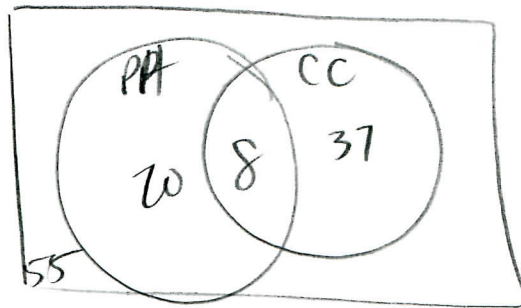
Question	Yes	No
1. Have you skied either cross-country or downhill?	65	55
2. If you answered Yes to Question 1, did you ski downhill?	28	37
3. If you answered Yes to Question 1, did you ski cross-country?	45	20

→ CC

→ prt

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?

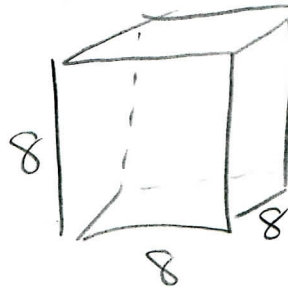
- E
- A. 73
 B. 65
 C. 47
 D. 18
 E. 8



$$65 - 37 - 20 = 8$$

25. What is the surface area, in square inches of an 8-inch cube?

- B
- A. 512
 B. 384
 C. 320
 D. 256
 E. 192



$$\begin{aligned}
 SA &= 2lw + 2bh + 2lh \\
 &= 2(8)(8) + 2(8)(8) + 2(8)(8) \\
 &= 3[2(8)(8)] = 384
 \end{aligned}$$