

ACT Pre-TEST: 10th Graders

Since there are 10 questions you get 10 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.

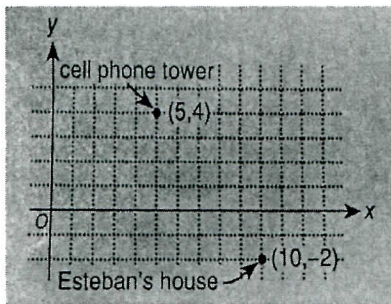
You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

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.

1. A map of Nelson County is laid out in the standard (x, y) coordinate plane below, where the center of the county is at (0, 0). A cell phone tower is at (5, 4) and Esteban's house is at (10, -2). Each coordinate unit represents 1 mile. The tower's signal range is 10 miles in all directions.



circle area
 πr^2
 $\pi(10)^2 = 100\pi$
314.159 m²

How much land area, to the nearest 10 square miles, does the tower's signal range cover?

- C**
- A. 80 m²
 - B. 100 m²
 - C. 310 m²**
 - D. 400 m²
 - E. 1,260 m²

2. The tower's signal range directly above a point (a, b) on the ground extends to an altitude, in miles, given by the function $f(x, b) = \sqrt{59 - a^2 + 10a - b^2 + 8b}$. A jet directly above Esteban's house is within the tower's signal range. What is the maximum altitude, in miles, of the jet?

skip long time

- F. $\sqrt{15}$
 G. $\sqrt{19}$
 H. $\sqrt{39}$
 J. $\sqrt{47}$
 K. $\sqrt{71}$

H

$f(10, -2)$

$$\sqrt{39} = \sqrt{59 - a^2 + 10a - b^2 + 8b}$$

$$39 = 59 - a^2 + 10a - (-2)^2 + 8(-2)$$

$$39 = 59 - a^2 + 10a - 4 - 16$$

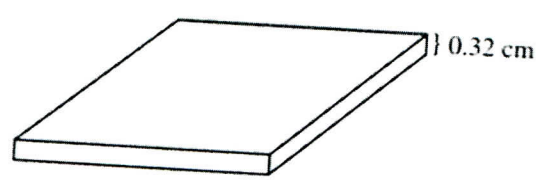
$$39 = 39 - a^2 + 10a$$

$$a^2 - 10a = 0$$

$$a(a - 10) = 0$$

$$a = 0 \quad a = 10$$

3. 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?



$$.32 = 2(.03) + X(.02)$$

$$.32 = .06 + .02X$$

$$.26 = .02X$$

X = 13

- A. 13
 B. 15
 C. 16
 D. 52
 E. 64

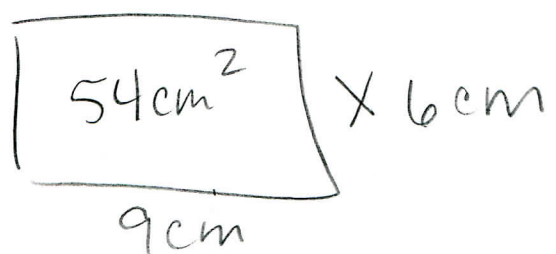
A

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

raw

- F. 6
 G. 12
 H. 15
 J. 24
 K. 30

K



$$9(x) = 54$$

$$x = 6$$

$$2(9) + 6(2) = 30$$

Solve for x that if the quantities

5. 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 figurines did Kami sell this month?

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

B

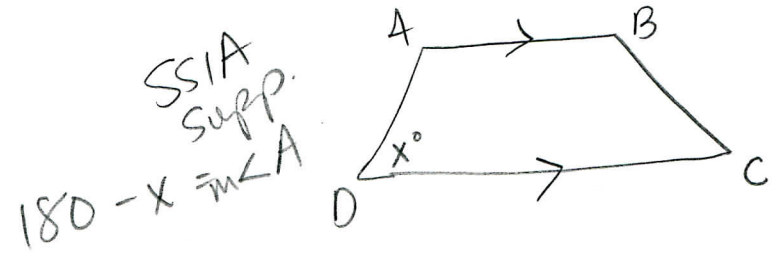
$x = \text{large}$
 $y = \text{small}$
 $x + y = 70$
 $12x = 8y$
 $x = 70 - y$
 $12(70 - y) = 8y$
 $840 - 12y = 8y$
 $840 = 20y$
 $y = 42$
 $x = 28$

Draw

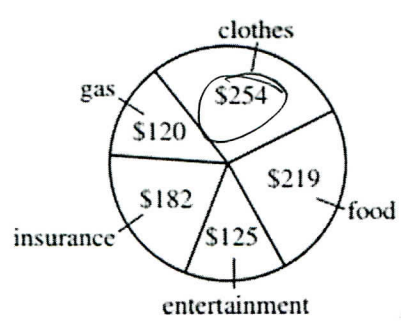
6. For trapezoid ABCD shown below, $\overline{AB} \parallel \overline{DC}$, the measures of the interior angles are distinct, and the measure of $\angle D$ is x° . What is the degree measure of $\angle A$ in terms of x ?

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

F



7. 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%?



$\frac{254}{900} = .28222$
 so 28%

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

B

8. 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 $\angle CAD$?

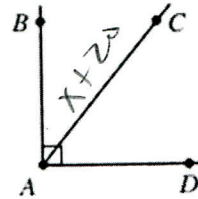
G

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

$$90 - (x + 20)$$

$$90 - x - 20$$

$$70 - x$$



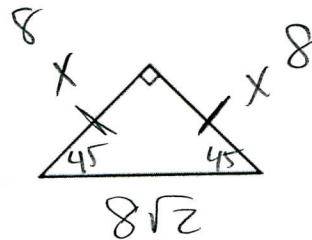
Special
 Pythagorean
 Triad

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

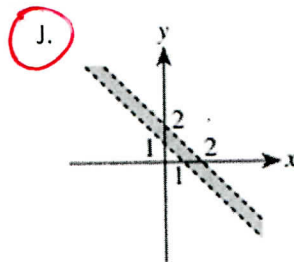
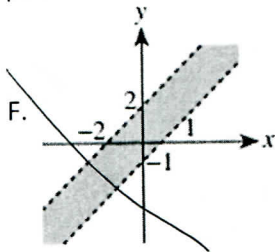
E

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

$$16 + 8\sqrt{2}$$



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



$$1 < x + y$$

$$-x -x$$

$$y > 1 - x$$

$$x + y < 2$$

$$y < -x + 2$$

J

