

# Practice Test Questions

ENGLISH  
MATH  
READING  
SCIENCE  
WRITING

## Math

### Test Tips

An actual ACT Mathematics Test contains 60 questions to be answered in 60 minutes.

- Read each question carefully to make sure you understand the type of answer required.
- If you choose to use a calculator, be sure it is permitted, is working on test day, and has reliable batteries.
- Use your calculator wisely.
- Solve the problem.
- Locate your solution among the answer choices.
- Make sure you answer the question asked.
- Make sure your answer is reasonable.
- Check your work.

#### Calculator Tips

- Review the latest information on permitted and prohibited calculators.
- You are not required to use a calculator. All the problems can be solved without a calculator.
- If you regularly use a calculator in your mathematics work, use one you're familiar with when you take the mathematics test. Using a more powerful, but unfamiliar, calculator is not likely to give you an advantage over using the kind you normally use.

**Click on letter choices below to view the correct answer and explanations.**

**MATH**

## SET FOUR

**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.

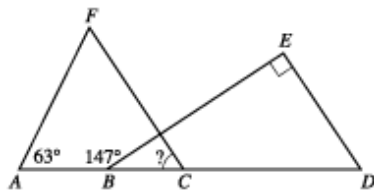
You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

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.

In the figure below,  $A$ ,  $B$ ,  $C$ , and  $D$  are collinear,  $\overline{FC}$  is parallel to  $\overline{ED}$ ,  $\overline{BE}$  is perpendicular to  $\overline{ED}$ , and the measures of  $\angle FAB$  and  $\angle EBA$  are as marked. What is the measure of  $\angle FCB$ ?

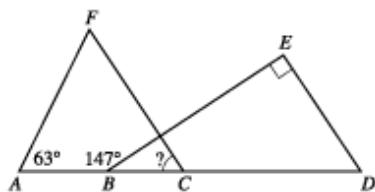


- A. ☐  $33^\circ$
- B. ☒  $57^\circ$
- C. ☐  $63^\circ$

- D. ☐  $84^\circ$
- E. ☐ Cannot be determined from the given information

**CORRECT RESPONSE** ^

**Correct!** B is the correct answer. Since  $\overline{FC}$  and  $\overline{ED}$  are two parallel line segments cut by transversal  $\overline{BE}$ ,  $\angle E$  and  $\angle BGC$  are corresponding angles. So, the measure of  $\angle BGC$  is  $90^\circ$ . Since  $\angle ABC$  and  $\angle GBC$  are supplementary angles, the measure of  $\angle GBC = 180^\circ - 147^\circ = 33^\circ$ . Looking at  $\triangle BGC$ , the sum of the measures of angles  $\angle GCB$ ,  $\angle BGC$ , and  $\angle GBC$  is  $180^\circ$ . So, the measure of  $\angle GCB + 90^\circ + 33^\circ = 180^\circ$ , or  $180^\circ - 90^\circ - 33^\circ = 57^\circ$ .



2.

Which of the following is an equation of the circle with its center at (0,0) that passes through (3,4) in the standard (x,y) coordinate plane?

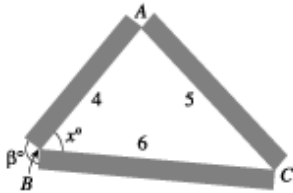
- F. ☐  $x - y = 1$
- G. ☐  $x - y = 25$
- H. ☐  $x^2 + y = 25$
- I. ☐  $x^2 + y^2 = 5$
- J. ☒  $x^2 + y^2 = 25$

**CORRECT RESPONSE** ^

**Correct!** The correct answer is K. The radius of the circle is the distance between (0,0) and (3,4), which is  $\sqrt{(3-0)^2 + (4-0)^2} = 5$ . An equation of a circle where (h,k) is the center and r is the radius is  $(x - h)^2 + (y - k)^2 = r^2$ . So  $(x - 0)^2 + (y - 0)^2 = 5^2$  or  $x^2 + y^2 = 25$ .

$$+ y_2 = 25.$$

Use the following information to answer questions 3–5. Taher has decided to create a triangular flower bed border. He plans to use 3 pieces of rectangular lumber with lengths 4, 5, and 6 feet, as shown in the figure below. Points A, B, and C are located at the corners of the flower bed.



3.

Taher plans to cut the 3 pieces of lumber for the flower bed border from a single

piece of lumber. Each cut takes  $\frac{1}{8}$  inch of wood off the length of the piece of

lumber. Among the following lengths, in inches, of pieces of lumber, which is the shortest piece that he can use to cut the pieces for the flower bed border?

- A. ☐ 178
- B. ☐ 179
- C. ☐ 180
- D. ☒ 181
- E. ☐ 182

**CORRECT RESPONSE** ^

**Correct!** You got the correct answer. The number of inches of wood needed if there

were no cuts is  $4 + 5 + 6 = 15$  feet, or 180 inches. However, you need to add  $2(<\frac{1}{8})$

for 2 cuts that are needed so that you have lumber for each of the 3 sides. Since 180

$+ 2\left(\frac{1}{8}\right) = 180 + \frac{1}{4}$ , the minimum piece needed to construct the flower bed border

including the 2 cuts would be 181 inches.

4.

The measure of  $\angle ABC$  in the figure is  $x^\circ$ . Which of the following is an expression for  $\beta^\circ$ ?

- F. ☐  $x^\circ$
- G. ☐  $2x^\circ$
- H. ☐  $(90 + x)^\circ$
- I. ☒  $(180 - x)^\circ$
- J. ☐  $\left(180 - \frac{x}{2}\right)^\circ$

CORRECT RESPONSE ^

**Correct!** This is the correct answer. The angles of the rectangular pieces of lumber measure  $90^\circ$ , so the sum of the measure of the angles at  $\beta$  is  $360^\circ$ .  $\beta + 90 + x + 90 = 360$ , or  $\beta = 180 - x$ .

5.

After arranging the flower bed, Taher decides that the flower bed would look more attractive if 1 of the angles in the triangle were a right angle. He decides to place the right angle at vertex A and to leave the lengths of  $\overline{AB}$  and  $\overline{AC}$  as 4 and 5 feet, respectively. To the nearest 0.1 foot, how long of a piece of lumber would he need to replace the 6-foot piece represented by  $\overline{BC}$ ?

- A. ☐ 3.0
- B. ☐ 3.3
- C. ☐ 6.0
- D. ☒ 6.4
- E. ☐ 7.8

CORRECT RESPONSE ^

**Correct!** 6.4 is the correct answer. Using the Pythagorean theorem,  $4^2 + 5^2 = (BC)^2$ . Then  $BC = \sqrt{4^2 + 5^2} = \sqrt{41} \approx 6.4$ .

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6.

Which one of the following expressions has an even integer value for all integers  $a$  and  $c$ ?

- F. ☒  $8a + 2ac$
- G. ☐  $3a + 3c$
- H. ☐  $2a + c$
- I. ☐  $a + 2c$
- J. ☐  $ac + a^2$

CORRECT RESPONSE ^

**Correct!** The correct response is F.  $8a + 2ac$  is even because it is divisible by 2,  $8a + 2ac = 2(4a + ac)$ , and  $4a + ac$  is an integer because  $a$  and  $c$  are integers.

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7.

A neighborhood recreation program serves a total of 280 children who are either 11 years old or 12 years old. The sum of the children's ages is 3,238 years. How many 11-year-old children does the recreation program serve?

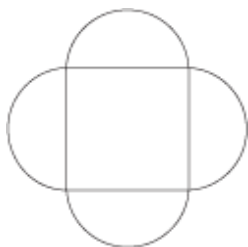
- A. ☐ 55
- B. ☒ 122
- C. ☐ 132
- D. ☐ 158
- E. ☐ 208

CORRECT RESPONSE ^

**Correct!** You correctly found the number of 11-year-olds to be 122. If you let  $e$  = number of 11-year-olds and  $t$  = number of 12-year-olds, then you can solve the system  $e + t = 280$  and  $11e + 12t = 3,238$ . Substitution, elimination, and matrices are just some of the methods you could use to solve the system. Just remember, in the end, you want to solve for  $e$ .

8.


The geometric figure shown below consists of a square and 4 semicircles. The diameters of the semicircles are the sides of the square, and each diameter is 10 centimeters long. Which of the following is the closest approximation of the total area, in square centimeters, of this geometric figure?

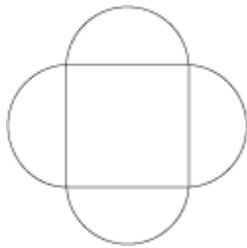


- F. ☐ 100

G. ☐ 160H. ☒ 260I. ☐ 400J. ☐ 730**CORRECT RESPONSE** ^

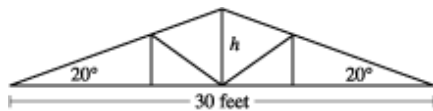
**Correct!** The correct answer is H. You found the area of the square, the area of 4 semicircles (or the area of 2 full circles), and added them.  $10^2 + 2\pi(5)^2$

 double tilde 257. The closest answer is 260.

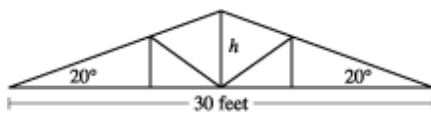


9.

Which of the following expressions is the closest approximation to the height  $h$ , in feet, of the roof truss shown below?

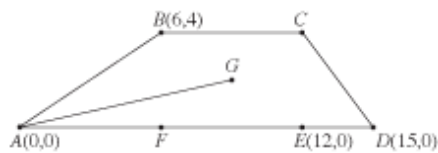
A. ☐  $15 \tan 20^\circ$ B. ☒  $15 \sin 20^\circ$



C. ☐  $30 \tan 20^\circ$ D. ☐  $30 \sin 20^\circ$ E. ☐  $\frac{15}{\sin 20^\circ}$ **INCORRECT RESPONSE** ^**Incorrect.** You found the length of  $\overline{WZ}$ , which is also the length of  $\overline{XW}$ .

10.

Quadrilateral  $ABCD$  is drawn on the standard  $(x,y)$  coordinate plane as shown below, with points  $E$  and  $F$  on  $\overline{AD}$ . Point  $G$  is the center of rectangle  $BCEF$ . How many coordinate units long is  $\overline{AG}$ ?

F. ☐  $\sqrt{10}$ G. ☐  $\sqrt{13}$ H. ☒  $\sqrt{85}$

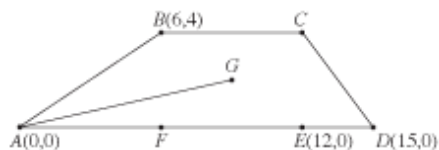
I. ☐  $\sqrt{97}$

J. ☐ 11

**CORRECT RESPONSE** ^

**Correct!** This is the correct answer. By drawing in rectangle  $BCEF$  and diagonal  $\overline{BE}$ , you can find the coordinates of  $G$  by finding the midpoint of  $\overline{BE}$ . So  $G$  is at

$\left(\frac{6+12}{2}, \frac{4+0}{2}\right)$ , or  $(9,2)$ . Using the distance formula,  $AC = \sqrt{(9-0)^2 + (2-0)^2} = \sqrt{81 + 4} = \sqrt{85}$ .



11.

What is the x-intercept of the graph of  $y = x^2 - 4x + 4$ ?

A. ☐ -2

B. ☐ -1

C. ☐ 0

D. ☐ 1

E. ☒ 2

**CORRECT RESPONSE** ^

**Correct!** 2 is the x-intercept. One way to find the x-intercept is to replace  $y$  with 0 and solve for  $x$ . If  $0 = x^2 - 4x + 4$ , then  $(x - 2)^2 = 0$ , and  $x = 2$ . Another way of doing this problem is to look at the graph of the equation and see where the graph crosses

the  $x$ -axis.

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12.

For all nonzero real numbers  $p$ ,  $t$ ,  $x$ , and  $y$  such that  $\frac{x}{y} = \frac{3p}{2t}$ , which of the following expressions is equivalent to  $t$ ?

F. ☐

$$\frac{y}{2}$$

G. ☐

$$\frac{3px}{2y}$$

H. ☐

$$\frac{6py}{x}$$

I. ☐

$$\frac{3py}{x}$$

J. ☒

$$\frac{3py}{2x}$$

CORRECT RESPONSE ^

**Correct!** You correctly solved the equation for  $t$ . If you cross multiply,  $2xt = 3py$ . Then

dividing each side by  $2x$ , you get  $t = \frac{3py}{2x}$ .

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[Next Page](#)



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