

ACT MATH PRACTICE

1. Five basketball players at Colonial High School have an average height of 6'3". If 4 of the players have heights of 6'1", 6'8", 6'4", and 6'3", how tall is the fifth player?

Since the average of the five players is 6'3", add the amount the taller players are above the average and the amount the shorter players are below the average. This sum must be 0 since each player is being compared to the average.

The 6'1" player is 2 inches below the average (-2), the 6'8" player is 5 inches above the average (+5), the 6'4" player is 1 inch above the average (+1), and the 6'3" player is 0 inches above the average (+0).

Adding: $(-2) + 5 + 1 + 0 = 4$.

Therefore, the fifth player must be 5'11", or 4 inches shorter than the average so that the discrepancy among the taller and shorter players when compared to the average totals 0.

The correct answer is C, 5'11".

2. If $2x - 3 = 7$, $x = ?$

$$2x - 3 = 7$$

add three to both sides

$$2x = 7 + 3$$

divide both sides by 2

$$x = (7 + 3) \div 2$$

The correct answer is K, $(7 + 3) \div 2$

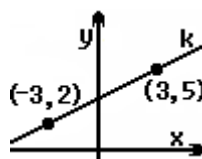
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3. A box contains beads that are all the same size and shape: 10 yellow beads and 20 blue beads. If one bead is selected from the box at random, what is the probability that the bead selected will be yellow?

Since there is a total of 30 beads and 10 are yellow, the probability of drawing a yellow bead is $\frac{10}{30} = \frac{1}{3}$.

The correct answer is D, $\frac{1}{3}$.

4. What is the slope of line k?



Use the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$.

$$m = \frac{5 - 2}{3 - (-3)} = \frac{3}{6} = \frac{1}{2}$$

The correct answer is J, $\frac{1}{2}$.

5. Given any positive proper fraction with the numerator less than the denominator, the decimal equivalent of that fraction:

All positive proper fractions are greater than 0 and less than 1.

The correct answer is A, is always < 1 .

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6. One solution to $x^2 + 5x + 1 = 0$ is $\frac{-5 - \sqrt{21}}{2}$. What is the other solution?

It is clear that the above solution was found using the quadratic formula.

The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Since the solution above contains subtraction of the radical term, the other solution will contain addition of the radical term.

The correct answer is F, $\frac{-5 + \sqrt{21}}{2}$.

7. What is the larger solution to the equation $2x^2 - x - 10 = 0$?

Solve the equation by factoring.

$$2x^2 - x - 10 = 0$$

$$(2x - 5)(x + 2) = 0$$

Set each factor equal to 0.

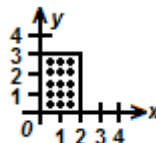
$$(2x - 5) = 0 \text{ and } (x + 2) = 0$$

$$x = \frac{5}{2} \text{ and } x = -2$$

The larger of the two solutions is $\frac{5}{2}$.

The correct answer is D, $\frac{5}{2}$.

8. If (a, b) are the (x, y) coordinates of any point in the shaded region shown below, or on its boundary, what is the smallest value of $1 \div (a + b)$?



As the denominator of a fraction increases, the value of the fraction will decrease. Use the largest values of x and y to maximize the denominator and minimize the value of the fraction. The largest values of x and y in the shaded area are

$x = 2$ and $y = 3$ ($a = 2$ and $b = 3$).

The resulting fraction is $1 \div (2 + 3) = \frac{1}{5}$.

The correct answer is G, $\frac{1}{5}$.

9. For all y , $(\sqrt{3}y)^3 = ?$

To cube $(\sqrt{3}y)$, rewrite $(\sqrt{3} \cdot \sqrt{3} \cdot \sqrt{3} \cdot y \cdot y \cdot y)$. The resulting answer will be $3\sqrt{3}y^3$.

The correct answer is B, $3\sqrt{3}y^3$.

10. The (x, y) coordinates of points A, B, and C below are $(2, 3)$, $(3, 2)$, and $(1, 1)$, respectively. If $\triangle ABC$ is translated so that A's new coordinates are $(4, 3)$ and B's are $(5, 2)$ what are the new coordinates of C?

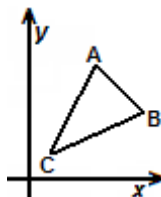


figure not to scale

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Comparing the original with the translated coordinate points, it is apparent that the x-values increase by 2 and the y-values remain the same.

The original coordinates of C are (1, 1). The new coordinates of C will be (3, 1).

The correct answer is G, (3, 1).

11. In a certain city, the assessed value of a house is 40% of the house's market value, and the property tax is 3.8% of the assessed value. What is the property tax on a house with a market value of \$60,000?

First find 40% of \$60,000.

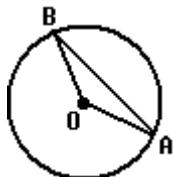
Multiply $(0.40) \times (60,000) = 24,000$.

Then find 3.8% of 24,000.

Multiply $(0.038) \times (24,000) = 912$.

The correct answer is B, \$912.

12. In the figure below, $\triangle OBA$ has one vertex at the center of a circle and two vertices on the circle. If angle OAB measures 24° , what is the measure of $\angle BOA$?



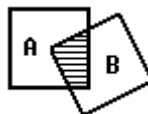
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A triangle formed inside a circle containing the central angle of the circle will be an isosceles triangle. Recall that an isosceles triangle has two sides of the same length and two base angles of the same measure. The two same-length sides are formed by radii of the circle (all radii of a circle have equal length).

Since $\angle OAB$ measures 24° , the other base angle ($\angle OBA$) must also equal 24° . Since all three angles must total 180° , the remaining central angle will be $180^\circ - 24^\circ - 24^\circ = 132^\circ$.

The correct answer is J, 132 degrees.

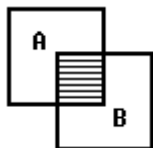
13. In the figure below, square A is overlapped by square B at A's center. If the area of A is 144 square units, what is the area in square units of the shaded area?



Imagine rotating square B about its pivot point at the center of square A so that the shaded area contains four 90° angles.

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It is now clear that the shaded area will always be $\frac{1}{4}$ of the area of square A.

Multiply $\frac{1}{4} \times 144 = 36$.

The correct answer is C, 36.

14. The lengths of the sides of the triangle below are 3, 4, and 5 units, and A is the measure of one of the angles, as indicated in the figure. What is $\sin A$?

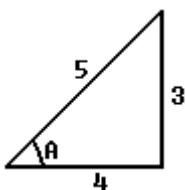


figure not to scale

By remembering the mnemonic SOHCAHTOA, we remember that

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{3}{5}$$

The correct answer is F, $\frac{3}{5}$.

15. In $\triangle ABC$ below, the measures of $\angle ACB$, $\angle CBA$, $\angle BAC$ are 90° , 50° , and 40° respectively. If CB is 4 units long, how many units long is AC?

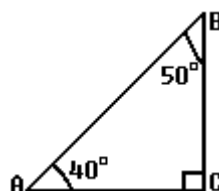
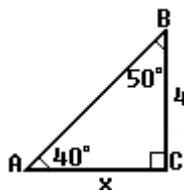


figure not drawn to scale

Label the diagram with the given information $CB = 4$.



From angle B, we know the length of the adjacent side, 4, and must find the length of the opposite side, x.

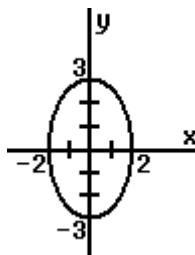
By remembering the mnemonic SOHCAHTOA, we remember that

$$\tan B = \frac{\text{opposite}}{\text{adjacent}}$$

$$\text{Therefore } \tan 50^\circ = \frac{x}{4} \text{ or } 4 \tan 50^\circ = x.$$

The correct answer is E, $4 \tan 50^\circ$.

16. What is the equation of the ellipse graphed below?



The standard equation for an

$$\text{ellipse is } \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$$

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From the diagram, $a = 2$ and $b = 3$,

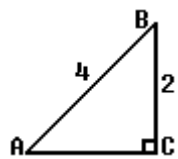
$$\text{then } \frac{x^2}{2^2} + \frac{y^2}{3^2} = 1$$

Or simply plug in points to determine which answer choice is correct. Easily found points are $(2, 0)$, $(0, 3)$, $(-2, 0)$, and $(0, -3)$.

The correct answer is J, $\frac{x^2}{4} + \frac{y^2}{9} = 1$.

17. In the figure below, $\triangle ABC$ is a right triangle. Hypotenuse AB is 4 units long and side BC is 2 units long. How many units long is side AC?

Figure not to scale



Use Pythagorean Theorem $a^2 + b^2 = c^2$. Remember that the hypotenuse is always c .

$$2^2 + b^2 = 4^2$$

$$4 + b^2 = 16$$

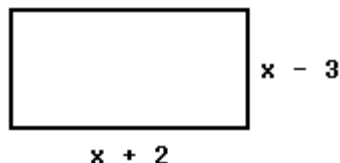
$$b^2 = 12$$

take the square root of both sides

$$b = \sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$$

The correct answer is B, $2\sqrt{3}$.

18. The length of a rectangle is $x + 2$ inches; the width is $x - 3$ inches. What is the area, in square inches, of the rectangle?



To find the area of the rectangle, multiply width \times length by using FOIL (first, outside, inside, last).

$$\begin{aligned} &(x + 2)(x - 3) \\ &x^2 - 3x + 2x - 6 \\ &x^2 - x - 6 \end{aligned}$$

The correct answer is G, $x^2 - x - 6$.

19. A large auditorium contains 90 rows with 80 seats per row. The seats and rows are each numbered consecutively starting with 1. If students at a test can sit only in odd-numbered seats in even-numbered rows, what is the largest number of students allowed in the auditorium?

There are 40 seats per row that are odd-numbered. There are 45 rows that are even-numbered.

Multiply $40 \times 45 = 1800$.

The correct answer is D, 1800.

20. What is the decimal equivalent of $\frac{7}{20}$?

The quickest way to solve this problem is to realize that $\frac{7}{20} = \frac{35}{100}$. The decimal form of

$\frac{35}{100}$ is 0.35.

Or divide 7 by 20 on a calculator to find the decimal 0.35.

The correct answer is H, 0.35.
