

1. In a sack are 4 slips of paper. Each slip of paper has one number written on the slip of paper. The first slip has a 3; the second slip has a 7, the third slip has a 13, and the fourth slip has a 48. If one of the slips is selected at random, find the probability that the slip selected has a prime number written on it. Express your answer as a common fraction reduced to lowest terms.
2. $\triangle BOA$ has its vertices at $B(0,22)$, $O(0,0)$, and $A(16,0)$. The median from point O intersects \overline{AB} at D . Give the **ordered pair** representing the coordinates of D .
3. Does the circle $(x-3)^2 + (y+2)^2 = 25$ contain the point with coordinates of $(6,6)$ in its interior? For your answer, write the whole word **Yes** or **No**, whichever is correct.
4. **(Multiple Choice) For your answer write the capital letter that corresponds to the best answer.**

Which of the following is (are) true?

- I. $\sin 60^\circ = \cos 30^\circ$
- II. $\cos 87^\circ = -\cos 267^\circ$
- III. $\tan\left(\frac{\pi}{5}\right) = \tan\left(\frac{6\pi}{5}\right)$

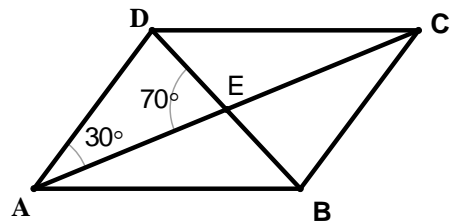
- A) I only B) II only C) III only D) I and II only E) I and III only
F) II and III only G) I, II, and III

Note: Be certain to write the correct capital letter as your answer.

5. Find the sum of a geometric progression of 9 terms if the first term is 2, and the common ratio is 3.
6. Let x be an integer such that $0 < x < 150$. Find the sum of all possible distinct values of x such that $\cos(2x+8)^\circ > 0$ and $\sin(5x-12)^\circ < 0$.
7. Find the amplitude of the graph of the equation: $16y = 80\sin(64(4x^\circ - 32^\circ))$.

8. A sine function has amplitude of 5, a radian period of $\frac{\pi}{2}$, and a radian phase shift of $\frac{\pi}{6}$. The point $(\frac{x\pi}{12}, 5)$ is on the graph of this sine function. If $2.9 < x < 4.4$, find the value of x . Express your answer as a **decimal**.
9. In a right isosceles triangle, find the value of the **sum** of the tangent of one **acute** angle and the cotangent of the other **acute** angle.
10. Let $f(x) = x^3 - 21x^2 + 72x + 2327$. The set of values for the real number k such that $f(x) - k$ will have three distinct real zeroes is $\{k : w < k < p\}$. Find the value of $(w + p)$.
11. If one of the six points $(-2, 5)$, $(1, 4)$, $(3, -5)$, $(3, 4)$, $(-7, 1)$, $(5, 5)$ is selected at random, find the probability that the point selected is in the interior of the circle whose equation is $x^2 + y^2 = 36$. Express your answer as a common fraction reduced to lowest terms.
12. An apartment rental company has a total of 400 apartments available of which 250 are presently rented at \$550 per month. The company has decided it will only raise or lower the rent per month, for all rented apartments, by integral increments of \$10. A survey has shown that, so long as there are apartments that have not been rented, for each \$10 drop in rent per month, there will be 8 new tenants. Find the number of dollars in the monthly rent that will maximize total income.

13. In the diagram, $ABCD$ is a parallelogram in which the diagonals intersect at E . If $\angle DAC = 30^\circ$ and $\angle DEA = 70^\circ$, find the degree measure of $\angle CAB$. Express your answer as a **decimal** rounded to the nearest hundredth of a degree.



14. A light metal rod of uniform density is 1 meter and 4 centimeters long. It is suspended in the middle and balances at the 52 cm mark. There are one gram weights hung on the rod at the following distances from the left end: 4 cm, 19 cm, 36 cm, 47 cm, 51 cm, 74 cm, 77 cm, and 87 cm. There is a three gram weight hung on the rod at k cm from the left end. Find the value of k .
15. A right circular cylinder has a **total** surface area of 132π . Find the maximum volume of such a right circular cylinder. Express your answer as a **decimal** rounded to the nearest hundredth.
16. When $(2x - y)^{10}$ is expanded and completely simplified, find the numerical coefficient of the term containing x^4y^6 .
17. For what value of k will the graph of $f(x) = 17 \cos\left(\frac{1}{k}x\right)^\circ$ have a **degree** period of 3? Express your answer as a common fraction reduced to lowest terms.
18. If the magnitude of the three dimensional vector $(2, 3, p)$ is $\sqrt{38}$, find the smallest possible value of p .
19. In convex pentagon $ABCDE$, the degree measure of $\angle BAE$ is twice the degree measure of $\angle ABC$. If $\angle AED = 176^\circ$, $\angle EDC = 141^\circ$, and $\angle DCB = 40^\circ$, find the degree measure of $\angle BAE$.
20. In Triangle ABD , $\angle BAD = 90^\circ$. Point C lies on \overline{BD} such that $\angle BAC \cong \angle DAC$, $BC = 8$, and $CD = 9$. A second triangle, Triangle EFG , exists such that $\overline{AB} \cong \overline{EF}$, $\overline{FG} \cong \overline{BC}$, and $\angle BAC \cong \angle FEG$. However, the area of Triangle BAC is **not** the same as the area of Triangle FEG . Find the area of Triangle FEG . Express your answer as a **decimal** rounded to the nearest hundredth.

1. $\frac{3}{4}$ (Must be this reduced common fraction.)
2. (8,11) (Must be this ordered pair.)
3. No (Must be the whole word.)
4. G (Must be this capital letter.)
5. 19682
6. 2167
7. 5
8. 3.5 (Must be this decimal.)
9. 2
10. 4290
11. $\frac{2}{3}$ (Must be this reduced common fraction.)
12. 430 (\$ optional)
13. 22.12 (Must be this decimal, degrees optional.)
14. 59 (Cm. optional.)
15. 648.36 (Must be this decimal, cubic units optional.)
16. 3360
17. $\frac{1}{120}$ (Must be this reduced common fraction.)
18. -5
19. 122 (Degrees optional.)
20. 30.01 (Must be this decimal, sq. units optional.)