



May 2022

Summer Math Work: Calculus

We hope you are enjoying your summer but are also thinking about how to have a great school year next year.

The attached problem set is intended to address Geometry topics needed for success. **All Geometry students are required to complete the problem set to be turned in to their teacher as a homework assignment when returning to school in the fall.** This is the "summer reading" for your mathematics course. Be sure to show your work clearly in completing the problems.

If you find that there are specific topics that you need to review in more depth, you may want to spend some time doing so. Please consider this in planning your time to work.

You are welcome to receive help on any of the problems or topics covered. Indeed, if you have difficulty, we encourage you to work with a parent, older sibling, friend, or teacher so that you master each topic. You may consult a textbook or online resource if you wish as you work through the problems. **Be sure, however, to show all your work, and that you understand all the work you present. Note that you will have a graded classroom test on this material shortly after the start of school in September.**

We do not expect this packet to be a burden for you. However, we know that reviewing these topics will put you in a much better position to succeed in Geometry.

Best wishes for a happy rest of the summer.

The work in this packet was completed independently by my daughter.

Parent Signature _____

*Please **DO NOT** use a calculator in completing this packet.*

REMEMBER TO WORK ON ABOUT TEN PROBLEMS EACH WEEK SO YOUR BRAIN CAN STAY
MATHEMATICALLY ACTIVE ALL SUMMER LONG. THANK YOU!

PART 1:

1. Simplify

a. $\frac{x-4}{x^2-3x-4}$

b. $\frac{x^3-8}{x-2}$

c. $\frac{5-x}{x^2-25}$

2. Trigonometric Pythagorean Identities

a) $\sin^2 x + \cos^2 x = \underline{\hspace{2cm}}$

b) $1 + \tan^2 x = \underline{\hspace{2cm}}$

c) $\cot^2 x + 1 = \underline{\hspace{2cm}}$

3. Simplify each expression. Write answers with positive exponents where applicable:

a) $\frac{1}{x+h} - \frac{1}{x}$ b) $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$ c) $\frac{12x^{-3}y^2}{18xy^{-1}}$ d) $(5a^{\frac{2}{3}})(4a^{\frac{3}{2}})$ e) $(4a^{\frac{5}{3}})^{\frac{3}{2}}$

f) $\log \frac{1}{100}$ g) $\ln e^7$ h) $27^{\frac{2}{3}}$ i) $\log_{\frac{1}{2}} 8$ j) $x^{\frac{3}{2}}(x + x^{\frac{5}{2}} - x^2)$

4. Using either the slope/intercept or point slope form of a line, write an equation for the lines described:

- a. Containing the points (1,-3) and (-5,2)
- b. With slope 0, containing the point (4,2)
- c. Parallel to $2x-3y = 7$ and passes through (5,1)
- d. Perpendicular to the line in part d, containing the point (3,4)

5. Without a calculator, determine the EXACT value of the expression:

a) $\sin \frac{\pi}{2}$

b) $\sin \frac{3\pi}{4}$

c) $\cos \pi$

d) $\cos \frac{7\pi}{6}$

e) $\cos \frac{\pi}{3}$

f) $\tan \frac{7\pi}{4}$

g) $\tan \frac{2\pi}{3}$

h) $\tan \frac{\pi}{2}$

PART 2

SHORT ANSWER. Show all work box all answers

For the pair of functions, find the indicated sum, difference, product, or quotient.

1) $f(x) = 7x - 8$, $g(x) = 3x - 7$

Find $(f - g)(x)$.

1) _____

2) $f(x) = 4 - 4x$, $g(x) = -9x^2 + 4$

Find $(f + g)(x)$.

2) _____

3) $f(x) = x^2 + 1$, $g(x) = 6x - 4$

Find $(fg)(x)$.

3) _____

4) $f(x) = \sqrt{4x + 4}$, $g(x) = \sqrt{4x - 16}$

Find $(fg)(x)$.

4) _____

Factor the polynomial completely.

5) $x^2 + 6x - 27$

5) _____

6) $x^2 + 23x + 24$

6) _____

7) $10x^2 + 21x + 9$

7) _____

8) $5x^2 + 7x - 6$

8) _____

9) $14x^2 + 63x - 35$

9) _____

10) $x^2 - 121$

10) _____

11) $2x^2 - 50$

11) _____

Solve the equation.

12) $3x(x + 8) = (2x - 1)(x + 8)$

12) _____

Simplify the expression. All exponents should be positive integers.

13) $-4x^{-5}y(7x^5y)z^4$

13) _____

14) $\left(\frac{6x^{-3}z^3}{2xz^{-3}} \right)^{-3}$

14) _____

Solve the equation for the specified variable.

15) $P = \frac{A}{1 + rt}$ for r

15) _____

16) $P = \frac{Fd}{t}$ for t

16) _____

Solve the equation.

17) $\frac{19}{x} = 4 - \frac{1}{x}$

17) _____

18) $\frac{7}{x+3} - \frac{5}{x-3} = \frac{8}{x^2 - 9}$

18) _____



SAT Practice No Calculator 30 Minutes Max

1

If $5x + 6 = 10$, what is the value of $10x + 3$?

- A) 4
- B) 9
- C) 11
- D) 20

2

$$\begin{aligned}x + y &= 0 \\ 3x - 2y &= 10\end{aligned}$$

Which of the following ordered pairs (x, y) satisfies the system of equations above?

- A) $(3, -2)$
- B) $(2, -2)$
- C) $(-2, 2)$
- D) $(-2, -2)$

3

A landscaping company estimates the price of a job, in dollars, using the expression $60 + 12nh$, where n is the number of landscapers who will be working and h is the total number of hours the job will take using n landscapers. Which of the following is the best interpretation of the number 12 in the expression?

- A) The company charges \$12 per hour for each landscaper.
- B) A minimum of 12 landscapers will work on each job.
- C) The price of every job increases by \$12 every hour.
- D) Each landscaper works 12 hours a day.

4

$$9a^4 + 12a^2b^2 + 4b^4$$

Which of the following is equivalent to the expression shown above?

- A) $(3a^2 + 2b^2)^2$
- B) $(3a + 2b)^4$
- C) $(9a^2 + 4b^2)^2$
- D) $(9a + 4b)^4$



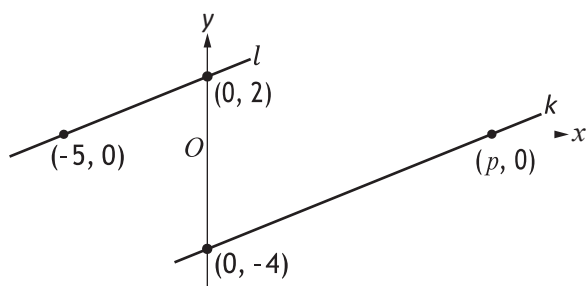
5

$$\sqrt{2k^2 + 17} - x = 0$$

If $k > 0$ and $x = 7$ in the equation above, what is the value of k ?

- A) 2
- B) 3
- C) 4
- D) 5

6



In the xy -plane above, line l is parallel to line k . What is the value of p ?

- A) 4
- B) 5
- C) 8
- D) 10

7

If $\frac{x^a}{x^b} = x^{16}$, $x > 1$, and $a + b = 2$, what is the value of $a - b$?

- A) 8
- B) 14
- C) 16
- D) 18

8

$$nA = 360$$

The measure A , in degrees, of an exterior angle of a regular polygon is related to the number of sides, n , of the polygon by the formula above. If the measure of an exterior angle of a regular polygon is greater than 50° , what is the greatest number of sides it can have?

- A) 5
- B) 6
- C) 7
- D) 8



9

The graph of a line in the xy -plane has slope 2 and contains the point $(1, 8)$. The graph of a second line passes through the points $(1, 2)$ and $(2, 1)$. If the two lines intersect at the point (a, b) , what is the value of $a + b$?

- A) 4
- B) 3
- C) -1
- D) -4

10

Which of the following equations has a graph in the xy -plane for which y is always greater than or equal to -1 ?

- A) $y = |x| - 2$
- B) $y = x^2 - 2$
- C) $y = (x - 2)^2$
- D) $y = x^3 - 2$

11

Which of the following complex numbers is equivalent to $\frac{3 - 5i}{8 + 2i}$? (Note: $i = \sqrt{-1}$)

- A) $\frac{3}{8} - \frac{5i}{2}$
- B) $\frac{3}{8} + \frac{5i}{2}$
- C) $\frac{7}{34} - \frac{23i}{34}$
- D) $\frac{7}{34} + \frac{23i}{34}$

12

$$R = \frac{F}{N + F}$$

A website uses the formula above to calculate a seller's rating, R , based on the number of favorable reviews, F , and unfavorable reviews, N . Which of the following expresses the number of favorable reviews in terms of the other variables?

- A) $F = \frac{RN}{R - 1}$
- B) $F = \frac{RN}{1 - R}$
- C) $F = \frac{N}{1 - R}$
- D) $F = \frac{N}{R - 1}$



13

What is the sum of all values of m that satisfy $2m^2 - 16m + 8 = 0$?

- A) -8
- B) $-4\sqrt{3}$
- C) $4\sqrt{3}$
- D) 8

14

A radioactive substance decays at an annual rate of 13 percent. If the initial amount of the substance is 325 grams, which of the following functions f models the remaining amount of the substance, in grams, t years later?

- A) $f(t) = 325(0.87)^t$
- B) $f(t) = 325(0.13)^t$
- C) $f(t) = 0.87(325)^t$
- D) $f(t) = 0.13(325)^t$

15

The expression $\frac{5x-2}{x+3}$ is equivalent to which of the following?

- A) $\frac{5-2}{3}$
- B) $5 - \frac{2}{3}$
- C) $5 - \frac{2}{x+3}$
- D) $5 - \frac{17}{x+3}$



16

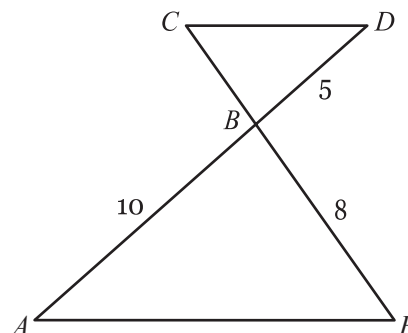
The sales manager of a company awarded a total of \$3000 in bonuses to the most productive salespeople. The bonuses were awarded in amounts of \$250 or \$750. If at least one \$250 bonus and at least one \$750 bonus were awarded, what is one possible number of \$250 bonuses awarded?

17

$$2x(3x + 5) + 3(3x + 5) = ax^2 + bx + c$$

In the equation above, a , b , and c are constants. If the equation is true for all values of x , what is the value of b ?

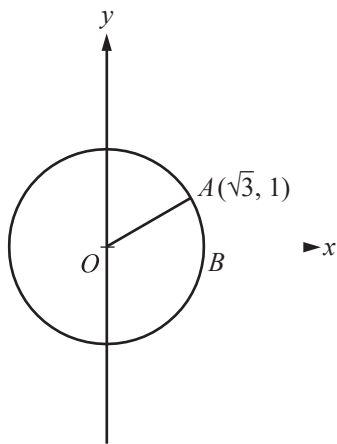
18



In the figure above, $\overline{AC} \parallel \overline{DE}$ and segment AD intersects segment CE at B . What is the length of segment CE ?



19



In the xy -plane above, O is the center of the circle, and the measure of $\angle AOB$ is $\frac{\pi}{a}$ radians. What is the value of a ?

20

$$ax + by = 12$$

$$2x + 8y = 60$$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of $\frac{a}{b}$?

STOP

**If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.**