

1. Given the following:

A = the slope of the line  $4x + 3y = 2$

B = the slope of the line  $x - 5y = 3$

C = the y-intercept of the line  $y - 4 = 3(x + 2)$

D = the x-intercept of the line  $y + 3 = 2(x - 4)$

What is the value of  $AD+BC$ ?

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What is the value of  $AD+BC$ ?

2. Let  $f(x) = 12x^2 - 17x + 6$

Given the following:

A is the y-intercept of  $f(x)$

B is the value of the axis of symmetry of  $f(x)$

C is the product of the zeros of  $f(x)$

D is the y-coordinate of the vertex

What is the value of  $\frac{A^2D+(B-D)+C}{A+B+C}$  ?

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3. Let there be a line  $f(x) = -\frac{2}{3}x + 3$

Given the following:

A is the slope of the line perpendicular to  $f(x)$

B is the slope of the line that passes through the origin and the point where  $x=1$  on  $f(x)$

C is the y-intercept of the line perpendicular to  $f(x)$  that passes through the point (2,5)

D is the x-intercept of the line perpendicular to  $f(x)$  that passes through the point (5,2)

What is the value of  $A^C - (B - D)$

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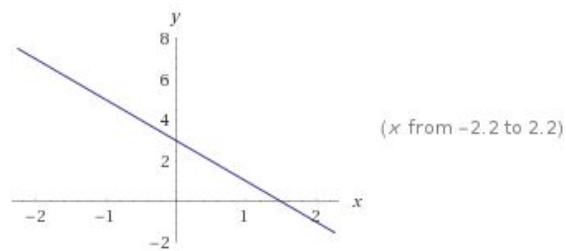
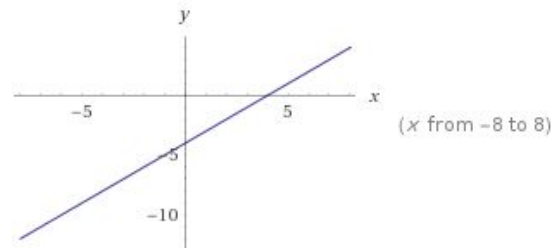
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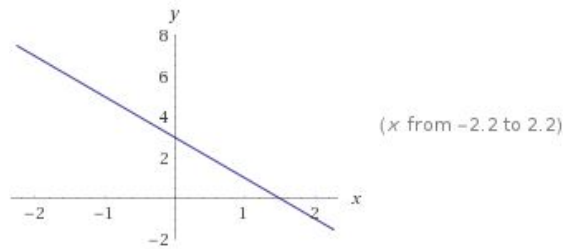
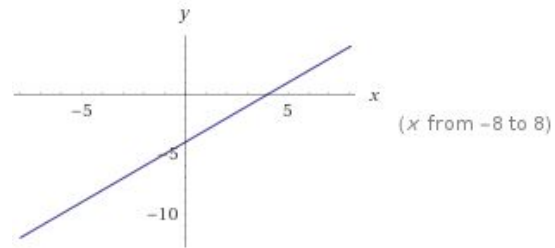
B is the slope of the line that passes through the origin and the point where  $x=1$  on  $f(x)$   
 C is the y-intercept of the line perpendicular to  $f(x)$  that passes through the point  $(2,5)$   
 D is the x-intercept of the line perpendicular to  $f(x)$  that passes through the point  $(5,2)$

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4. What is the equation of the figure formed from the multiplication of the two lines shown below in vertex form?



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5. Given the following:

A = The sum of the next 4 terms in the sequence: 1, 1, 2, 3, 5, 8, 13...

B = The sum of the next 2 terms in the sequence: 1, 4, 9, 16, 25...

C = The sum of the first 10 counting numbers

D = The difference between the sixth and fifth term in the sequence: 2, 4, 8, 16, 32...

What is the value of  $A + B - C + D$

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What is the value of  $A + B - C + D$

6. Let

A = the number of real solutions to  $21x^2 - 32x + 13$

B = the number of real solutions to  $5x^2 - 23x + 24$

C = the number of real solutions to  $3x^2 - 42x + 147$

D = the number of real solutions to  $19x^2 - 6x - 2$

Find  $\frac{B+D}{A+C}$

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7. Three consecutive positive integers have a product of 13,800. What is the sum of the three integers?

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8. Let:

A = The sum of the zeroes in  $x^{2019\pi x}$

B = The number of zeroes in  $x^2 + \pi x - \pi$

C = The value of  $\frac{x}{a}$  in  $x^2 - 4ax + 4a^2 = 0$

What is the value of  $\frac{A}{(B+C)}$  ?

8. Let:

A = The sum of the zeroes in  $x^{2019\pi x}$

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What is the value of  $\frac{A}{(B+C)}$  ?

9. Let  $\sqrt{\alpha\beta} = 9$

Given the following:

$$A = \alpha + 3$$

$$B = \beta + 4$$

$$C = \alpha + \beta$$

$$D = \alpha\beta + 81$$

What is the value of  $\frac{\alpha\beta(A+B+C)-D(A+B)}{81}$  ?

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10. Let  $P(x)$  be a trinomial with a degree of 2 and  $Q(x)$  be a binomial with a degree of 2.

Given the following:

A is the degree  $P(x) + Q(x)$

B is the degree of  $P(Q(x))$

C is the degree of  $P(x) \times Q(x)$

D is the sum of the possible number of terms of  $P(x) + Q(x)$

What is the value of  $\frac{A^B}{C} + D$  ?

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What is the value of  $\frac{A^B}{C} + D$  ?

11. The total number of ants in an ant colony is modeled by  $f(x) - g(x)$ . The number of new ants in an ant colony is modeled by the function  $f(x) = 3^t$ , and the number of dead ants in the colony is modeled by the function  $g(x) = t^2$  where t represents the time in days.

Given the following:

- A is the total number of ants in the colony on the ninth day
- B is the number of new ants born between the fifth and sixth day
- C is the number of ants that die between the sixth and seventh day
- D is the minimum number of days for the population of the ant colony to exceed 600 ants

What is the value of  $\frac{A+B}{D} + C$  ?

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What is the value of  $\frac{A+B}{D} + C$  ?

12. Simplify the following:

$$\frac{x^4y^6+x^3y^7}{x^7y^4-x^5y^6} \div \frac{x+y}{x^3y^2-x^2y^3}$$

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13. Let:

A = The sum of the zeroes of  $\frac{x-4}{x+2} + \frac{6}{2-x} + \frac{2x+5}{x^2-4}$

B = The sum of the zeroes of  $\frac{(x^{2021}+6x^{2020})}{9x^{2019}} = \frac{673}{3}$

C = The product of the zeroes of  $5x^3 + 20x^2 - 80x - 320$

What is the value of  $\frac{(A+C)}{B}$

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What is the value of  $\frac{(A+C)}{B}$

14. Let:

A = The seventh term in the sequence 3, 6, 12, 24...

B =  $1 + 2 + 3 + \dots + 8 + 9 + 10$

C =  $1 - 2 + 3 - 4 + \dots + 19 - 20$

D = The fifteenth term in the sequence 1, 4, 9, 16, 25...

What is the value of  $A + \frac{B+D}{C}$  ?

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What is the value of  $A + \frac{B+D}{C}$  ?

15. Simplify and rationalize denominator.

$$\frac{\sqrt{8x^3y^2}}{\sqrt{6x^5y^3}} \times \frac{\sqrt{3x^2y^5}}{\sqrt{12x^4y^5}}$$

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## Answers

1.  $-16/3$
2.  $23/346$
3.  $43/12$
4. First graph is  $y=x-4$  and second is  $y=-2x+3$  so a parabola is formed with equation  
$$-2\left(x - \frac{11}{2}\right)^2 + \frac{97}{2}$$
5. 261
6. 4
7. 72
8.  $A=0$ ,  $B=2$ ,  $C=2$ , so final answer is 0
9. -7
10. 7
11. 3,361
12.  $\frac{y^4}{x+y}$
13.  $A=10$ ,  $B=-6$ ,  $C=-16$ , so final answer is 1
14. 174
15.  $\frac{\sqrt{3y}}{3x^2y}$