

The Incredibles and Friends

Algebra I Solutions

1. Slope = $\frac{y_2 - y_1}{x_2 - x_1} \rightarrow \frac{410 - 10}{309 - 9} \rightarrow \frac{400}{300} = \frac{4}{3}$

2. $14x - 29 = 17x + 16$

$$-45 = 3x$$

$$-15 = x$$

3.
$$\begin{array}{r} 338 \\ \uparrow \\ 2169 \\ \uparrow \\ 13 \quad 13 \end{array}$$

So... $338 = 13^2 \cdot 2$
 $\sqrt{338} = \sqrt{13^2 \cdot 2}$
 $\sqrt{338} = 13\sqrt{2}$

4.
$$\begin{array}{r} 729 \\ \uparrow \\ 115 \\ 13 \cdot 13 \cdot 13 \end{array}$$

$$\sqrt[3]{729} = \sqrt[3]{13^3} = 13$$

5. $8x + 64 \leq 3x + 89$

$$5x \leq 15$$

$$x \leq 3$$

Only 3, fits the inequality.

6. $(-127) + (-126) + (-125) + \dots + 125 + 126 + 127$

With a closer look...

$$(-127) + (-126) + (-125) + \dots + 125 + 126 + 127$$

All the negative numbers have an 'equal' but opposite number to cancel out. The sum is thus, zero.

7. $x^2 - 5x - 150$

$$(x - 15)(x + 10)$$

$$x = 15, -10$$

We want the positive "x", so 15 yards.

8. $(8x+7)(4x-5)$

FoIL

$$32x^2 - 40x + 28x - 35$$

$$32x^2 - 12x - 35$$

$$32 - 12 - 35 = -15$$

9. The degree of a polynomial is equivalent to the highest power in the polynomial. Thus the answer is 9.

10. $y = 21x + 41$

$$y = 3x + 5$$

To find the intersection we make equations equal to each other so:

$$21x + 41 = 3x + 5$$

$$18x = -36$$

$$x = -2$$

To find the y-value of the intersection, plug in $x = -2$ in one of the equations: $y = 3x + 5$. $3(-2) + 5 = -1$

The intersection point is $(-2, -1)$. Abscissa means "x" and ordinate means "y". Thus, $x + y = -2 + (-1) = -3$.

11. The intended average is 90. So: $\frac{84 + 99 + 78 + 93 + 90 + x}{6} = 90$.

With simple calculation, "x" becomes

12.

A

B

The length of A to B is 250 miles. So on the way to B Kelsey goes $(250 - 100)$ mph. So it takes her $\frac{250}{150}$ hrs or $\frac{5}{3}$ hrs.

On the way back, she goes $(250 + 100)$ mph. So it takes her $\frac{250}{350}$ hrs on the way back, or $\frac{5}{7}$ hrs. So, $\frac{5}{7} + \frac{5}{3} = \frac{50}{21}$ hrs or approx. 2.4 hrs.

13. The positive primes less than 36 are:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31
There are 11 numbers.

14. To find a multiple of 3, add the digits of the numbers and divide by 3. If there is no remainder, it is in fact a multiple of 3.

For the number 9876543210: $9+8+7+6+5+4+3+2+1+0=45$,
which is a multiple of 3. So 9876543210 is a multiple of 3.

15. $y = 7x + 9$

$$-9 = 7x - y$$

$$7x - y = -9$$

16. $4x^2 + 64 = 128$

$$4x^2 = 64$$

$$x^2 = 16$$

$$x = \pm 4 \text{ or } \{-4, 4\}$$

17. $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$d = \sqrt{(11 - 4)^2 + (62 - 38)^2}$$

$$d = \sqrt{625}$$

$$d = 25 \text{ units}$$

18. $(2^{10} - 4) = (2^{10} - 2^2)$

Using the property $a^2 - b^2 = (a-b)(a+b)$

$$(2^5 - 2)(2^5 + 2) = (30)(32) = 960$$

19. $y = \text{number of Doors} > y = \frac{k}{x}$
 $x = \text{number of Incidents}$

It is given that $y = 50$, $x = 2$. $50 = \frac{k}{2}$, $k = 100$

So $y = \frac{100}{x}$, and $x = 10$, so $y = \frac{100}{10} = 10$ Doors.

$$20. \begin{array}{r} 431, 432, 433, \dots, 1343, 1344, 1345 \\ -430 \quad 430 \quad 430 \quad \quad 430 \quad 430 \quad 430 \end{array}$$

$$1, 2, 3, \dots, 913, 914, (915)$$

So 915 cups.

$$21. 4x + 19 = 83$$

$$4x = 64$$

$$x = 16 \text{ cups.}$$

22. By definition, slopes that are perpendicular are negative reciprocals of each other. Thus, $-\frac{A}{B} \cdot \frac{B}{A} = -1$.

$$23. 1 + 1 + 2 + 3 + 5 + 8 + 13 + 21 + 34 + 55 = 143.$$

$$24. \text{Ginches} = .5 \text{ feet. He is 35 feet away, so it will take}$$

$$\text{him } \frac{35 \text{ feet}}{.5 \text{ feet/sec}} = 350 \text{ sec.}$$

$$25. \text{The volume of the cube is } 8 \text{ feet} \times 4 \text{ feet} \times 5 \text{ feet} = 160 \text{ ft}^3.$$

$$\text{So we can fit } \frac{160 \text{ ft}^3}{\frac{320}{9} \text{ ft}^3} = 4.5 \text{ Mr. Incredibles.}$$

$$1 \text{ Mr. Incredible}$$

26. The volume of the cube is 5^3 ft^3 or 125 ft^3 . If Edna reported a volume 25 ft^3 greater, then she reported $(125 + 25) \text{ ft}^3 = 150 \text{ ft}^3$.

$$27. 3^2 = 3^4 = 81$$

$$28. 2^{5x} = 3^5 \rightarrow 2^x = 3$$

29. The different combinations is the product of all possible jackets, pants, and socks. So $4 \times 8 \times 9 = 288$ combinations.

30. -12^2 is -144 because the negative is not put under parenthesis