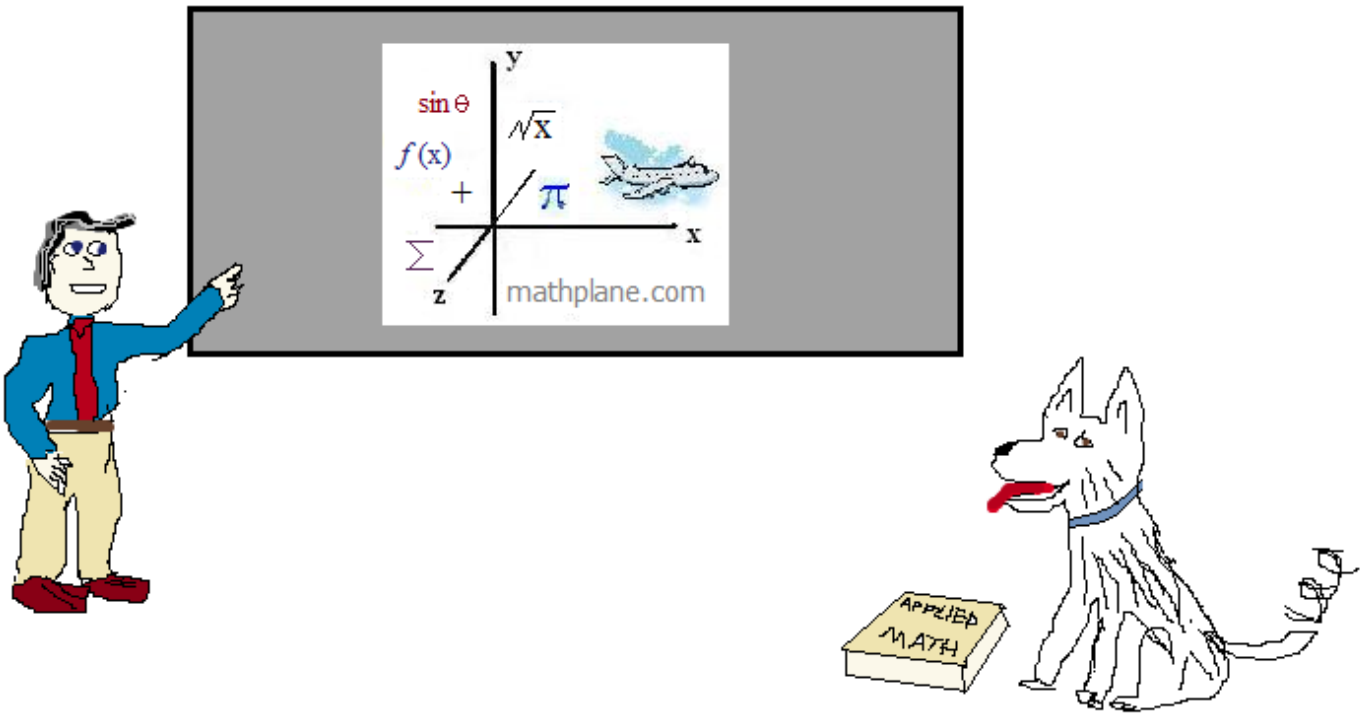
Algebra Preview Questions



Topics include fractions, decimals, solving equations, word problems, percentages, distributive property, and more.

Algebra Equations: Fractions, Decimals, Negatives

I. Decimals

a) $.3x + .6 = 1.2$

b) $2.07 + x = 6.14$

c) $4m + 2.4 = 3.2$

d) $-21.5 + 11d = 11.5$

e) $23.01 + x = 52.1$

f) $3(2.4 + 1.1) = x + 2.3$

II. Fractions

a) $\frac{x}{8} = 24$

b) $-2 + \frac{x}{3} = \frac{1}{2}$

c) $\frac{2}{3}B + 8 = 14$

d) $4(z + 2) = \frac{8}{3}$

e) $7y = \frac{1}{14}$

f) $\frac{2m}{5} + 10 = 20$

Algebra Equations: Fractions, Decimals, Negatives

III. Negatives

a) $y - 3 = -8$

b) $2r = -26$

c) $3x + 3 = -9$

d) $-(x + 5) = 12$

e) $\frac{-x}{6} - 8 = -12$

f) $2z - (-3) = -15$

IV. Word Problems -- Set up each algebra equation and solve.

a) Math books cost $32.50 apiece. If you pay $100 for 3 books, how much change will you receive?

b) After 5 math tests, your average is 92. If your first four scores were 85, 93, 88, and 95, what was the score on your 5th test?

c) Apples cost $1 and oranges cost $1.50 at the fruit stand.
If I spend $25 and take 7 apples, how many oranges did I buy?

d) Gasoline is $3.25 per gallon and my car can drive 30 miles per gallon.
How much will a 360 mile trip cost?

Algebra Preview: Mental math

Substitution --- Evaluate each equation.

Example: $2e + 14 =$

if $e = 3$	$e = 0$	$e = -1$
$2(3) + 14 = \boxed{20}$	$2(0) + 14 = \boxed{14}$	$2(-1) + 14 = \boxed{12}$

a) $2n \cdot 1 + 0 =$

if $n = 0$	$n = 4$	$n = 10$

b) $(3w + 19) - 5 =$

if $w = 1$	$w = 0$	$w = 2$

c) $\dfrac{3y}{3 - y} =$

if $y = 0$	$y = 2$	$y = 4$

d) $\dfrac{v + 1}{v - 1} =$

if $v = 0$	$v = 2$	$v = 7$

e) $3(x + 4) - 2(x + 3) =$

if $x = 6$	$x = 0$	$x = 1$

f) $2z + 4(z + 1) =$

if $z = -1$	$z = 0$	$z = 5$

g) $t^2 - 4t + 6 =$

if $t = 4$	$t = 0$	$t = -2$

h) $(k + 1)(k - 8) =$

if $k = -2$	$k = 0$	$k = 8$

Distributive Property problems

1) $3x - 5(x - 2) = 21$

2) $-2(x - 5) + 8(2 - x) = 20$

3) $3(x + 2) - 6(4 - x) = 8x$

4) $.2(10x - 12) = .3(x + 20) + .1$

5) $\frac{3 + 4x}{2} = 7x - 6$

6) $\frac{3 - 6x}{4} = \frac{2x + 1}{2}$

7) $\frac{1}{3}(3x + 6) = 5x - 2(x - 3)$

8) $-\frac{1}{4}(12x - 8) = \frac{1}{5}(15x + 5)$

9) $\frac{2}{3}(18x - 6) = 4x$

10) $\frac{4x + 7}{2} = \frac{6x + 5}{3}$

11) $2(x - 50) - 3x + 8 = x$

12) $2x - 4(x + 5) = 3x + 10$

Algebra Practice Exercise: "Solve for .... "

Formula	Solve for:	Bonus: What formula is this?
1) $d = rt$	r = t =	
2) $F = \frac{9}{5}C + 32$	C =	
3) $P = 2L + 2W$	L = W =	
4) $m = \frac{y_2 - y_1}{x_2 - x_1}$	y_2 = y_1= x_2 =	
5) $A = \frac{h(b_1 + b_2)}{2}$	h = b_2 =	
6) $a^2 + b^2 = c^2$	c = a =	
7) $V = \frac{1}{3}\pi r^2 h$	h = r =	
8) $PV = nRT$	R = P =	
9) $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$	x_1=	
10) $(x - h)^2 + (y - k)^2 = r^2$	x = k =	

Algebra I Preview Can you answer the following questions?

1) A bag of marbles has 4 blue, 6 red, and 10 white marbles.
What is the probability of picking a blue marble and then a white marble (without replacement)?

a) $\frac{1}{10}$

b) $\frac{7}{20}$

c) $\frac{2}{19}$

d) $\frac{3}{5}$

e) $\frac{7}{10}$

2) $\frac{x+3}{5} = \frac{x}{2}$

a) 1

b) 2

c) 3

d) 4

e) 5

3) What is the slope of a line that is *perpendicular* to $5x + 4y = 16$?

a) −5/4

b) 1/5

c) 4/5

d) 5/4

e) 5

4) After a 15% discount, you paid \$60 for a sweater. What is the original retail price?

a) \$51

b) \$69

c) \$70.59

d) \$75

e) \$75.22

5) What is the perimeter of the quadrilateral?

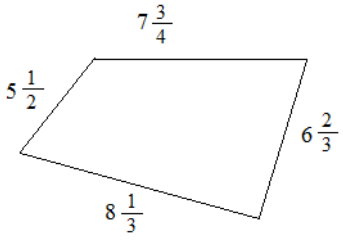
a) $26\frac{1}{4}$

b) $26\frac{7}{17}$

c) $26\frac{7}{12}$

d) 27

e) $28\frac{1}{4}$



Algebra I Preview

6) $10 = |x - 4| + 5$

a) 9

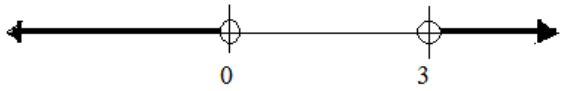
b) -1

c) -1, 9

d) 19

e) -11, 19

7) Write an equation for the inequality:



a) $x \leq 0$ or $x \geq 3$

b) $x < 0$ or $x > 3$

c) $x < 0$ and $x > 3$

d) $0 < x < 3$

e) $0 > x > 3$

8) $2x(x + 9) - x + 3(x + 2)$

a) $5x + 15$

b) $7x + 14$

c) $2x^2 + 8x + 14$

d) $2(x^2 + 10x + 3)$

e) $2x^2 + 2x + 15$

9) Round to the nearest *tenth*: 5.3718

a) 5.3

b) 5.4

c) 5.37

d) 5.371

e) 5.372

10) Simplify $(2x^5)^3(7x^7)^2$

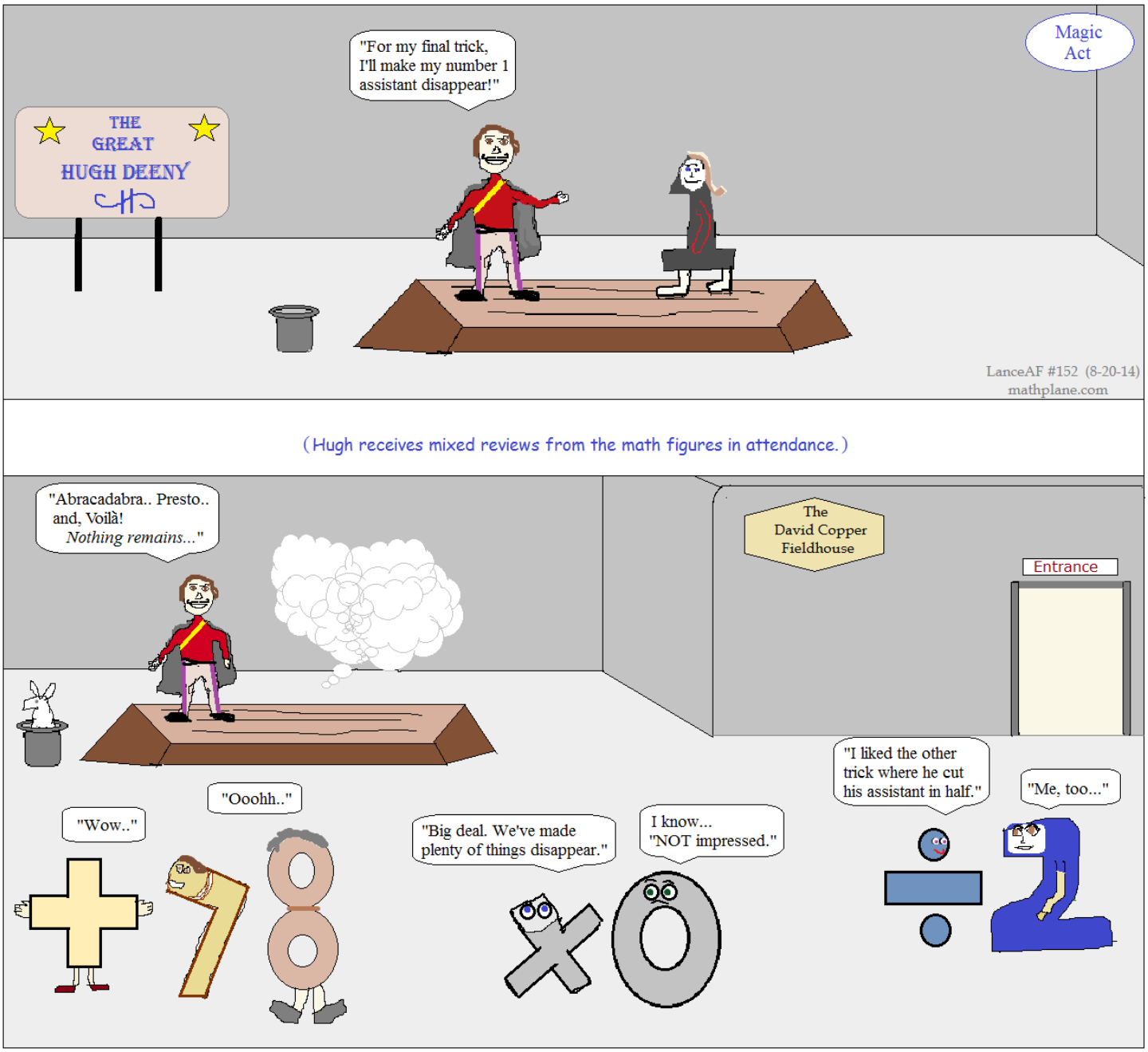
a) $14x^{17}$

b) $14x^{29}$

c) $84x^{17}$

d) $84x^{29}$

e) $392x^{29}$



And, the solutions are...

Algebra Equations: Fractions, Decimals, Negatives

SOLUTIONS

I. Decimals

a) $.3x + .6 = 1.2$

$- .6 \quad - .6$

$\frac{.3x}{.3} = \frac{.6}{.3}$

$x = 2$

b) $2.07 + x = 6.14$

$- 2.07 \quad - 2.07$

$x = 4.07$

c) $4m + 2.4 = 3.2$

$- 2.4 \quad - 2.4$

$\frac{4m}{4} = \frac{.8}{4}$

$m = .2$

d) $-21.5 + 11d = 11.5$

$+21.5 \quad +21.5$

$\frac{11d}{11} = \frac{33}{11}$

$d = 3$

e) $23.01 + x = 52.10$

$- 23.01 \quad - 23.01$

$x = 29.09$

f) $3(2.4 + 1.1) = x + 2.3$

$3(3.5) = x + 2.3$

$10.5 = x + 2.3$

$-2.3 \quad -2.3$

$x = 8.2$

II. Fractions

a) $\frac{x}{8} = 24$

(multiply both sides by 8)

$x = 192$

b) $-2 + \frac{x}{3} = \frac{1}{2}$

$+2 \quad +2$

$\frac{x}{3} = \frac{5}{2}$

(multiply each side by 3)

$x = \frac{15}{2}$

c) $\frac{2}{3}B + 8 = 14$

$-8 = -8$

$\frac{2}{3}B = 6$

(multiply each side by reciprocal 3/2)

$B = 18/2 = 9$

d) $4(z + 2) = \frac{8}{3}$

multiply each side by 1/4

$z + 2 = \frac{8}{12}$

$-2 \quad -2$

$z = \frac{-16}{12} = \frac{-4}{3}$

e) $7y = \frac{1}{14}$

divide each side by 7

$y = \frac{1}{14} \cdot \frac{1}{7}$

$y = \frac{1}{98}$

f) $\frac{2m}{5} + 10 = 20$

$-10 \quad -10$

$\frac{2}{5}m = 10$

multiply by reciprocal 5/2

$m = 10 \cdot \frac{5}{2}$

$m = 25$

Algebra Equations: Fractions, Decimals, Negatives

SOLUTIONS

III. Negatives

a) $y - 3 = -8$

$+3 \quad +3$

$y = -5$

b) $\frac{2r}{2} = \frac{-26}{2}$

$r = -13$

c) $3x + 3 = -9$

$-3 \quad -3$

$\frac{3x}{3} = \frac{-12}{3}$

$x = -4$

d) $-(x + 5) = 12$

multiply both sides by -1

$x + 5 = -12$

$-5 \quad -5$

$x = -17$

e) $\frac{-x}{6} - 8 = -12$

$+8 \quad +8$

$\frac{-1}{6}x = -4$

(multiply by -6)

$x = 24$

f) $2z - (-3) = -15$

$2z + 3 = -15$

$-3 \quad -3$

$2z = -18$

(multiply by 1/2)

$z = -9$

IV. Word Problems -- Set up each algebra equation and solve.

a) Math books cost $32.50 apiece. If you pay $100 for 3 books, how much change will you receive?

Let C = change

$\$100 - (3 \text{ books} \cdot \$32.50/\text{book}) = C$

$\$100 - (\$97.50) + C$

$C = \$2.50$

b) After 5 math tests, your average is 92. If your first four scores were 85, 93, 88, and 95, what was the score on your 5th test?

$\text{Average} = \frac{\text{Total}}{\text{\# of items}}$

Let F = Fifth test

$92 = \frac{(85 + 93 + 88 + 95 + F)}{5}$

multiply by 5... $460 = (85 + 93 + 88 + 95 + F)$

$460 = 361 + F$

subtract 361... $F = 99$

c) Apples cost $1 and oranges cost $1.50 at the fruit stand. If I spend $25 and take 7 apples, how many oranges did I buy?

A = # of apples

O = # of oranges

$A(\$1) + O(\$1.50) = \$25$

$7(\$1) + O(\$1.50) = \$25$

$\$7 + \$1.50(O) = \$25$

$\$1.50(O) = \$18$ divide by $1.50

$O = \frac{\$18}{\$1.50} = 12$

d) Gasoline is $3.25 per gallon and my car can drive 30 miles per gallon. How much will a 360 mile trip cost?

G = # of gallons

$G \cdot 30\frac{\text{miles}}{\text{gallon}} = 360 \text{ miles}$

divide each side by 30 miles/gallon

$G = 12 \text{ gallons}$

$\text{Cost} = G \cdot \frac{\$3.25}{\text{gallon}}$

$= 12 \text{ gallons} \cdot \frac{\$3.25}{\text{gallon}} = \$39$

Algebra Preview: Mental math

Answers

Substitution --- Evaluate each equation.

Example: $2e + 14 =$

if e = 3	e = 0	e = -1
2(3) + 14 = 20	2(0) + 14 = 14	2(-1) + 14 = 12

a) $2n \cdot 1 + 0 =$

if n = 0	n = 4	n = 10
2(0) • 1 + 0 = 0	2(4) • 1 + 0 = 8	2(10) • 1 + 0 = 20

1 is multiplicative identity; 0 is additive identity

b) $(3w + 19) - 5 =$

if w = 1	w = 0	w = 2
(3 + 19) - 5 = 17	(0 + 19) - 5 = 14	(6 + 19) - 5 = 20

c) $\frac{3y}{3 - y} =$

if y = 0	y = 2	y = 4
0/3 = 0	6/1 = 6	12/(-1) = -12

d) $\frac{v + 1}{v - 1} =$

if v = 0	v = 2	v = 7
1/(-1) = -1	3/1 = 3	8/6 = 4/3

e) $3(x + 4) - 2(x + 3) =$

if x = 6	x = 0	x = 1
3(10) - 2(9) = 12	3(4) - 2(3) = 6	3(5) - 2(4) = 7

f) $2z + 4(z + 1) =$

if z = -1	z = 0	z = 5
-2 + 4(0) = -2	0 + 4(1) = 4	10 + 4(6) = 34

g) $t^2 - 4t + 6 =$

if t = 4	t = 0	t = -2
16 - 16 + 6 = 6	0 - 0 + 6 = 6	4 + 8 + 6 = 18

h) $(k + 1)(k - 8) =$

if k = -2	k = 0	k = 8
(-1)(-10) = 10	(1)(-8) = -8	(9)(0) = 0

Distributive Property problems

SOLUTIONS

1) $3x - 5(x - 2) = 21$

$3x - 5(x) - 5(-2) = 21$

$-2x + 10 = 21$

$-2x = 11$

$x = -11/2$

2) $-2(x - 5) + 8(2 - x) = 20$

$-2(x - 5) + 8(2 - x) = 20$

$-2x + 10 + 16 - 8x = 20$

$-10x + 26 = 20$

$-10x = -6$

$x = 3/5$

3) $3(x + 2) - 6(4 - x) = 8x$

$3(x) + 3(2) - 6(4) - 6(-x) = 8x$

$3x + 6 - 24 + 6x = 8x$

$9x - 18 = 8x$

$+18 \quad +18$

$9x = 8x + 18$

$x = 18$

quick check: if x = 18,

$3(18 + 2) - 6(4 - 18) = 8(18)$

$60 - 6(-14) = 144$

$144 = 144$ ✓

4) $.2(10x - 12) = .3(x + 20) + .1$

distribute each side

$2x - 2.4 = .3x + 6 + .1$

collect like terms

$1.7x = 8.5$

multiply each side by 10 to move the decimals..

$17x = 85$

$x = 5$

quick check:

$.2(38) = .3(25) + .1$

$7.6 = 7.5 + .1$

$7.6 = 7.6$ ✓

5) $\frac{3 + 4x}{2} = 7x - 6$

$2\left(\frac{3 + 4x}{2}\right) = 2(7x - 6)$

$3 + 4x = 14x - 12$

$15 = 10x$

$x = \frac{15}{10} = \frac{3}{2}$

6) $\frac{3 - 6x}{4} = \frac{2x + 1}{2}$

"cross multiply"

$4(2x + 1) = 2(3 - 6x)$

distribute the terms

$4(2x) + 4(1) = 2(3) - 2(6x)$

$8x + 4 = 6 - 12x$

$20x = 2$

$x = \frac{1}{10}$

7) $\frac{1}{3}(3x + 6) = 5x - 2(x - 3)$

For ease, multiply equations by 3 to get rid of the fractions

$(3x + 6) = 15x - 6(x - 3)$

$3x + 6 = 9x + 18$

$-12 = 6x$

$x = -2$

8) $-\frac{1}{4}(12x - 8) = \frac{1}{5}(15x + 5)$

For ease, multiply both sides by 20

$-5(12x - 8) = 4(15x + 5)$

Now, distribute each side...

$-60x + 40 = 60x + 20$

$+60x - 20 \quad +60x - 20$

$0 + 20 = 120x + 0$

$x = \frac{1}{6}$

9) $\frac{2}{3}(18x - 6) = 4x$

multiply each side by reciprocal $\frac{3}{2}$

$18x - 6 = \frac{12}{2}x$

$12x = 6$

$x = \frac{1}{2}$

10) $\frac{4x + 7}{2} = \frac{6x + 5}{3}$

Cross-multiply

$2(6x + 5) = 3(4x + 7)$

Distribute the terms

$12x + 10 = 12x + 21$

$0 = 11$

NO SOLUTIONS!

11) $2(x - 50) - 3x + 8 = x$

$2x - 100 - 3x + 8 = x$

$-92 = 2x$

$x = -46$

12) $2x - 4(x + 5) = 3x + 10$

Distribute the terms (don't forget to distribute the negative)

$2x - 4x - 20 = 3x + 10$

$-2x - 20 = 3x + 10$

$-5x = 30$

$x = -6$

Algebra Practice Exercise: "Solve for .... "

SOLUTION

Formula	Solve for:	Bonus: What formula is this?
1) $d = rt$	$r = \frac{d}{t}$ $\quad t = \frac{d}{r}$	Distance Formula Distance = Rate(Time)
2) $F = \frac{9}{5}C + 32$	$C = \frac{5}{9}(F - 32)$ $\quad F - 32 = \frac{9}{5}C$ subtract 32 from both sides $\frac{5}{9}(F - 32) = C$ multiply both sides by 5/9	Temperature Converting Celsius to Fahrenheit
3) $P = 2L + 2W$	$L = \frac{P - 2W}{2}$ subtract 2W from both sides $P - 2W = 2L$ then, divide by 2 $W = \frac{P}{2} - L$ subtract 2L from both sides $P - 2L = 2W$ then, divide by 2	Perimeter of a Rectangle Perimeter = 2(length) + 2(width)
4) $m = \frac{y_2 - y_1}{x_2 - x_1}$	$y_2 = m(x_2 - x_1) + y_1$ $\quad y_1 = y_2 - m(x_2 - x_1)$ $\quad x_2 = \frac{y_2 - y_1}{m} + x_1$ $m(x_2 - x_1) = y_2 - y_1$ $\quad m(x_2 - x_1) - y_2 = -y_1$ $\quad (x_2 - x_1) = \frac{y_2 - y_1}{m}$	Slope of a line found from 2 points
5) $A = \frac{h(b_1 + b_2)}{2}$	$h = \frac{2A}{(b_1 + b_2)}$ $\quad 2A = h(b_1 + b_2)$ $b_2 = \frac{2A}{h} - b_1$ $\quad 2A = h(b_1 + b_2)$ $\quad \frac{2A}{h} = (b_1 + b_2)$	Area of a Trapezoid
6) $a^2 + b^2 = c^2$ a, b, and c are > 0	$c = \sqrt{a^2 + b^2}$ $\quad a = \sqrt{c^2 - b^2}$	Pythagorean Theorem (right triangles) 
7) $V = \frac{1}{3}\pi r^2 h$ all variables > 0	$h = \frac{3V}{\pi r^2}$ $\quad \frac{3V}{\pi} = r^2 h$ $\quad r = \sqrt{\frac{3V}{\pi h}}$	Volume of a cone where h = height r = radius of the base
8) $PV = nRT$	$R = \frac{PV}{nT}$ $\quad P = \frac{nRT}{V}$	Ideal Gas Law (Physics)
9) $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ $d^2 = (x_1 - x_2)^2 + (y_1 - y_2)^2$	$x_1 = \sqrt{d^2 - (y_1 - y_2)^2} + x_2$ $\quad d^2 - (y_1 - y_2)^2 = (x_1 - x_2)^2$ $\sqrt{d^2 - (y_1 - y_2)^2} = (x_1 - x_2)$	Distance formula between two points
10) $(x - h)^2 + (y - k)^2 = r^2$	$x = \sqrt{r^2 - (y - k)^2} + h$ $\quad k = \pm\sqrt{r^2 - (x - h)^2} + y$	Equation of a circle (h, k) is the center r is the radius

Algebra I Preview Can you answer the following questions? SOLUTIONS mathplane.com

1) A bag of marbles has 4 blue, 6 red, and 10 white marbles.
What is the probability of picking a blue marble and then a white marble (without replacement)?

a) $\frac{1}{10}$
b) $\frac{7}{20}$
c) $\frac{2}{19}$
d) $\frac{3}{5}$
e) $\frac{7}{10}$

probability = $\frac{\text{"\# of successes"}}{\text{"\# of possibilities"}}$

probability of 2 events occuring is p(event 1) x p(event 2)

p(blue marble) = $\frac{4}{20}$ p(white marble) = $\frac{10}{19}$

$\frac{4}{20} \cdot \frac{10}{19} = \frac{2}{19}$

2) $\frac{x+3}{5} = \frac{x}{2}$

a) 1
b) 2
c) 3
d) 4
e) 5

cross multiply $(x + 3) \cdot 2 = 5 \cdot x$

$2x + 6 = 5x$

solve $6 = 3x$

$x = 2$

(plug into original equation to check)

3) What is the slope of a line that is *perpendicular* to $5x + 4y = 16$?

a) −5/4
b) 1/5
c) 4/5
d) 5/4
e) 5

find slope of the line $5x + 4y = 16$

$4y = 16 - 5x$

$y = \frac{-5}{4}x + 4$

since slope is -5/4, the slope of a perpendicular line is the *opposite reciprocal*

$\frac{4}{5}$

4) After a 15% discount, you paid $60 for a sweater. What is the original retail price?

a) $51
b) $69
c) $70.59
d) $75
e) $75.22

original price − (discount) = sale price

X − (.15)(X) = $60

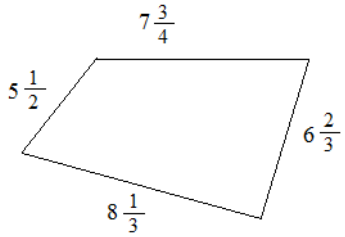
.85X = $60

X = $70.59

5) What is the perimeter of the quadrilateral?

a) $26\frac{1}{4}$
b) $26\frac{7}{17}$
c) $26\frac{7}{12}$
d) 27
e) $28\frac{1}{4}$

perimeter is the sum of all sides..



add the whole numbers:

$7 + 5 + 8 + 6 = 26$

add the fractions:

$\frac{3}{4} + \frac{1}{2} + \frac{1}{3} + \frac{2}{3} = 2\frac{1}{4}$

Algebra I Preview

SOLUTIONS

6) $10 = |x - 4| + 5$

a) 9

b) -1

c) -1, 9

d) 19

e) -11, 19

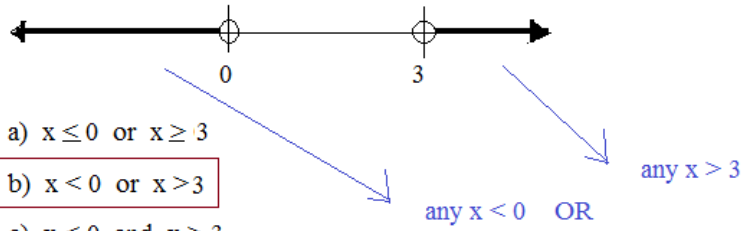
Isolate the absolute value:

$5 = |x - 4|$

Then, "split the absolute value": $5 = x - 4$, $x = 9$; $-5 = x - 4$, $x = -1$

(plug in both answers to check)

7) Write an equation for the inequality:



a) $x \leq 0$ or $x \geq 3$

b) $x < 0$ or $x > 3$

c) $x < 0$ and $x > 3$

d) $0 < x < 3$

e) ~~$0 > x > 3$~~ not logical

8) $2x(x + 9) - x + 3(x + 2)$

a) $5x + 15$

b) $7x + 14$

c) $2x^2 + 8x + 14$

d) $2(x^2 + 10x + 3)$

e) $2x^2 + 2x + 15$

distribute (and get rid of parentheses):

$2x^2 + 18x - x + 3x + 6$

collect terms:

$2x^2 + 20x + 6$

taking out greatest common factor:

$2(x^2 + 10x + 3)$

9) Round to the nearest *tenth*: 5.3718

a) 5.3

b) 5.4

c) 5.37

d) 5.371

e) 5.372

5.4 is the nearest tenth..

5.37 is the nearest hundredth...

5.372 is the nearest thousands...

10) Simplify $(2x^5)^3(7x^7)^2$

a) $14x^{17}$

b) $14x^{29}$

c) $84x^{17}$

d) $84x^{29}$

e) $392x^{29}$

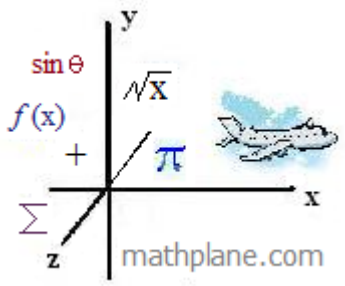
$(8x^{15}) \cdot (49x^{14})$

$392x^{29}$

Thanks for visiting. Hope it helped!

If you have questions, suggestions, or requests, let us know.

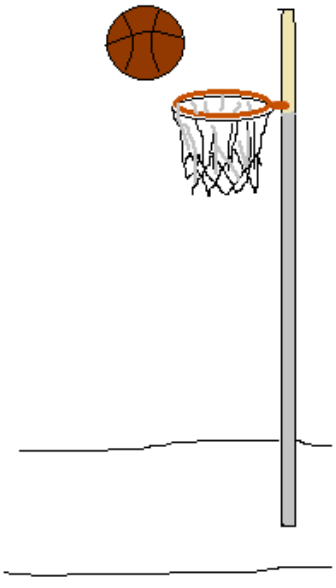
Cheers.



Two more questions…

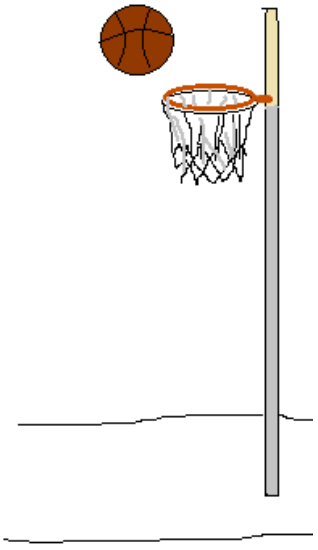
After 100 attempted free throws, my shooting percentage is 70%.
How many shots in a row would I have to make to increase my percentage to OVER 80%?

How many missed shots in a row would lower the percentage to BELOW 60%?



Answers -→

After 100 attempted free throws, my shooting percentage is 70%.
How many shots in a row would I have to make to increase my percentage to OVER 80%?



Solution: Since my shooting percentage is 70%, I've made 70 out of 100 attempts.

Let X = number of shots

$$\frac{\text{made shots}}{\text{attempts}} \qquad \frac{70 + X}{100 + X} = \frac{80}{100} \qquad 80\%$$

(cross multiply) $100(70 + X) = 80(100 + X)$

$7000 + 100X = 8000 + 80X$

$20X = 1000$

$X = 50$

Therefore, 51 in a row would raise percentage OVER 80%

How many missed shots in a row would lower the percentage to BELOW 60%?

Solution:

$$\frac{\text{made shots}}{\text{attempts}} \qquad \frac{70 + 0}{100 + X} = \frac{60}{100}$$

(cross multiply) $70(100) = 60(100 + X)$

$7000 = 6000 + 60X$

$1000 = 60X$

$X = 16.667$

Therefore, missing 17 shots in a row would drop the percentage under 60%