Algebra I

Review Test 002

(And, Solutions)

25 questions include radicals, graphing, linear equations, functions, absolute value, quadratics, word problems, and more!

mathplane.com

Math 002 Review Practice

1) a) Evaluate $x^3 + 4xy - 3y^2$ if $x = 2$ and $y = -3$

b) Simplify $5t - [3t - 2(6 + 4t) + 12]$

2) Simplify. Do not include negative exponents in your answers.

a) $\dfrac{6a^4b^7}{-(2a^2b)^2}$ b) $(3x^3y^5)(4x^{-5}y)$ c) $(4x^6)^{\frac{3}{2}}$ d) $\dfrac{-8m^{-4}n^3}{4m^{-3}n^4}$

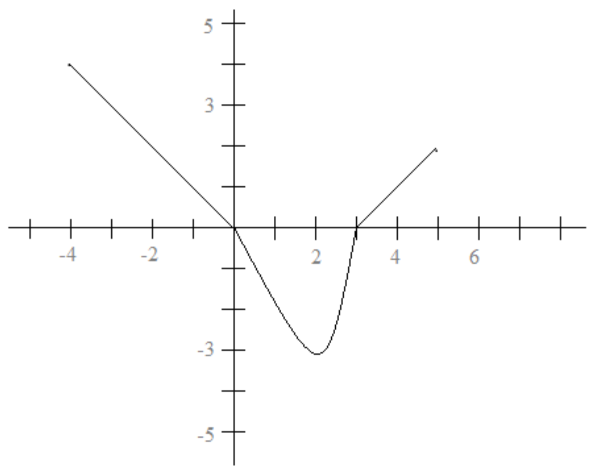
3) For the given graph, find each of the following:

a) $f(-3)$

b) the domain of f

c) all x where $f(x) = 0$

d) the (approximate) range of f



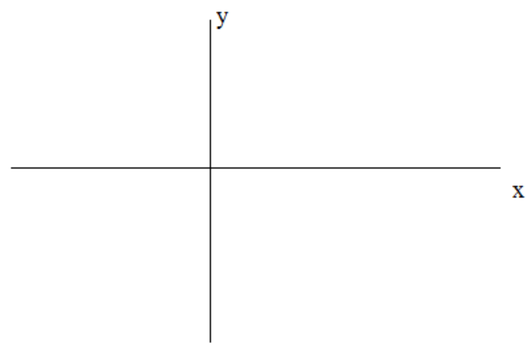
4) 10 calculators at the math store, including sales tax, cost \$1268.30. If sales tax is 10%, what is the price of each calculator?

5) Write the equation of a line containing the points (3, 5) and (1, -3). What is the y-intercept? What is the x-intercept?

Math 002 Review Practice

6) Solve the following system: $3x + 10y = 14$
$-5x + y = 12$

7) Sketch the following system: $x - 3y < 15$
$y \geq x - 7$

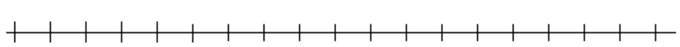


8) Tom sold 545 t-shirts at the weekend market. The prices were \$8.50 for each large and \$5 for each small. If total revenue was \$3873, how many of each size did he sell?

9) Solve for each:

a) $|x - 5| = 13$ b) $|y + 5| + 3 = 10$ c) $|3x| + 9 = 6$ d) $2|z + 2| = 16$

10) Solve the following: $(x + 3) + 4 < 2(x - 5)$
Write answer in *interval notation*; Graph the solution.



Math 002 Review Practice

11) Expand:

a) $(2x - 4)^2$

b) $(x + 3)(x^2 + 4x - 5)$

12) Given the polynomial $4x^3 - 3x^5 + 2x - 1$

a) What is the degree of the polynomial?

b) Arrange the terms in descending order.

c) What is the leading coefficient?

d) Evaluate the polynomial at $x = 1$

13) Factor:

a) $4 - 9x^2$

b) $2y^2 + 5y - 7$

c) $3x^2 + 15x + 12$

14) Solve:

a) $x^2 + 5x = -4$

b) $x^3 - 4x = 0$

c) $x^2 + 3x - 7 = 0$

15) Solve for m:

a) $y = \frac{Lm}{r}$

b) $5s - (2m + 3) = Q$

Math 002 Review Practice

16) What are the zeros of the function $f(x) = 3x^2 + 19x + 20$?

17) A water balloon is launched off a balcony with an initial velocity of 64 ft/second. It's height in feet, h(t), at t seconds is given by the function:

$$h(t) = -16t^2 + 64t + 96$$

a) What is the height of the balcony?

b) How high is the balloon at 2 seconds?

c) When does the balloon hit the ground?

18) Simplify

a) $\dfrac{m^2 + 4m + 3}{3m + 12} \cdot \dfrac{m + 4}{m^2 - 9}$

b) $\dfrac{x^2 - 4}{2x} \div \dfrac{x^2 - x - 6}{4x + 10}$

19) Solve $\dfrac{s}{s + 5} + \dfrac{4}{s - 1} = \dfrac{2s + 26}{s^2 + 4s - 5}$

20) Answer (leaving answers in $a + bi$ form)

a) $3 + 5i - (2 - 3i)$

b) $(5 + 3i)(2 + i)$

Math 002 Review Practice

21) Rationalize the denominator:

a) $\dfrac{2}{\sqrt{3}}$

b) $\dfrac{3}{5+\sqrt{6}}$

22) The diagonal of a square is 8 feet. What is the length of each side?

23) $g(x) = 3x^2 - 30x + 63$

a) Find $g(0)$

b) Find $g(n+1)$

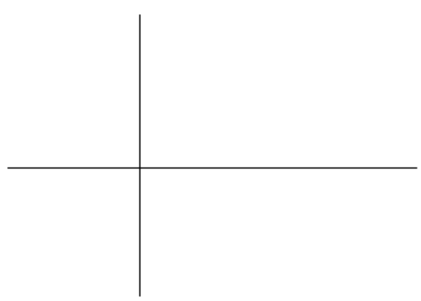
c) What is the vertex of the graph $y = g(x)$?

d) What are the zeros of the function?

24) Solve: $\sqrt{5x+54} = x+8$ (Identify extraneous solutions)

25) Sketch a graph of the following: $f(x) = -2(x-1)^2 + 4$

Label the vertex and 2 other points.




Math Poet
19 January
MDLXXXIV
$\sqrt{4b^2}$
"2b or not 2b? That is the question."
"Romeo, pay attention! stop staring at Juliet."
To earn a little extra coin, Bill Shakespeare works as a substitute math teacher.

SOLUTIONS

Math 002 Review Practice

SOLUTIONS

1) a) Evaluate $x^3 + 4xy - 3y^2$ if $x = 2$ and $y = -3$

$(2)^3 + 4(2)(-3) - 3(-3)^2 = 8 - 24 - 27 = \boxed{-43}$

b) Simplify $5t - [3t - 2(6 + 4t) + 12]$

$5t - [3t - 12 - 8t + 12] = 5t - [-5t] = \boxed{10t}$

2) Simplify. Do not include negative exponents in your answers.

a) $\dfrac{6a^4b^7}{-(2a^2b)^2}$

$\dfrac{6a^4b^7}{-(4a^4b^2)} = \boxed{\dfrac{-3b^5}{2}}$

b) $(3x^3y^5)(4x^{-5}y)$

$12x^{-2}y^6 = \boxed{\dfrac{12y^6}{x^2}}$

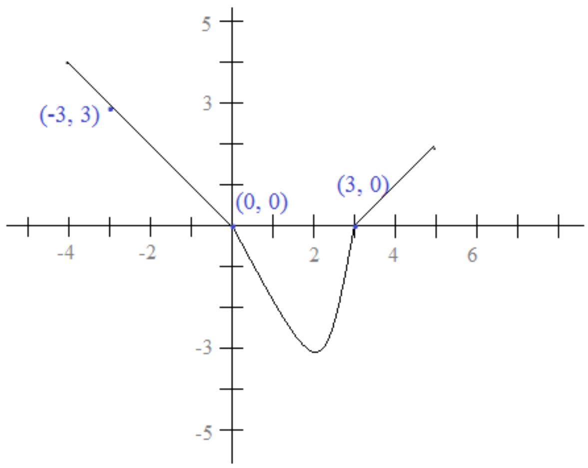
c) $(4x^6)^{\frac{3}{2}}$

$\boxed{8x^9}$

d) $\dfrac{-8m^{-4}n^3}{4m^{-3}n^4}$

$-2m^{-1}n^{-1} = \boxed{\dfrac{-2}{mn}}$

3) For the given graph, find each of the following:



a) $f(-3) = \boxed{3}$

b) the domain of f

(domain is all x values):

$\boxed{[-4, 5] \text{ or } -4 \le x \le 5}$

c) all x where $f(x) = 0$

$f(0) = 0$ and $f(3) = 0$

$\boxed{0 \text{ and } 3}$

d) the (approximate) range of f

(range is all $f(x)$ values)

$\boxed{[-3, 4] \text{ or } -3 \le x \le 4}$

4) 10 calculators at the math store, <u>including</u> sales tax, cost \$1268.30. If sales tax is 10%, what is the price of each calculator?

Let C = calculator cost

10C = cost of 10 calculators

.1 = sales tax rate

$10C + .1(10C) = 1268.30$

$11C = 1268.30$

$\boxed{C = \$115.20}$

5) Write the equation of a line containing the points (3, 5) and (1, -3). What is the y-intercept? What is the x-intercept?

$\text{slope} = \dfrac{\Delta y}{\Delta x} = \dfrac{5 - (-3)}{3 - 1} = 4$

$\boxed{\text{pt. slope form: } y - 5 = 4(x - 3)}$

$y - 5 = 4x - 12$

$\boxed{\text{slope intercept form: } y = 4x - 7}$

y-intercept: (0, -7)

x-intercept: (7/4, 0)

$0 = 4x - 7$

$x = 7/4$

Math 002 Review Practice

SOLUTIONS

6) Solve the following system: $3x + 10y = 14$, $-5x + y = 12$

$y = 5x + 12$

using substitution: $3x + 10(5x + 12) = 14$
$53x + 120 = 14$
$x = -2$

$3x + 10y = 14$
$3(-2) + 10y = 14$
$y = 2$

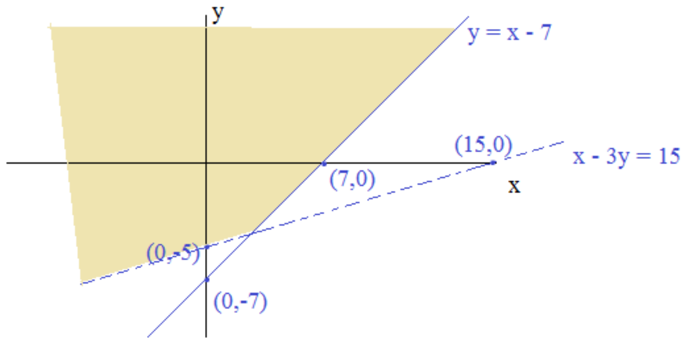
$\boxed{(-2, 2)}$

$-5(-2) + (2) = 12$
$10 + 2 = 12$
$12 = 12$ ✓

7) Sketch the following system: $x - 3y < 15$, $y \geq x - 7$

test (0, 0): $(0) - 3(0) < 15$
$0 < 15$ ✓

test (0, 0): $(0) \geq (0) - 7$
$0 \geq -7$ ✓



8) Tom sold 545 t-shirts at the weekend market. The prices were \$8.50 for each large and \$5 for each small. If total revenue was \$3873, how many of each size did he sell?

Let L = # of large shirts
S = # of small shirts

$L + S = 545$
$\$8.5(L) + \$5(S) = \$3873$

(using substitution)

$S = 545 - L$

$8.5(L) + 5(545 - L) = 3873$
$8.5L + 2725 - 5L = 3873$
$3.5L = 1148$
$\boxed{L = 328}$

$L + S = 545$
$(328) + S = 545$
$\boxed{S = 217}$

\$8.5 x 328 = \$2788
\$5 x 217 = \$1085
total = \$3873 ✓

9) Solve for each:

a) $|x - 5| = 13$

$x - 5 = 13$
$\boxed{x = 18}$

$x - 5 = -13$
$\boxed{x = -8}$

b) $|y + 5| + 3 = 10$

(isolate the absolute value term first!)

$|y + 5| = 7$

$y + 5 = 7$
$\boxed{y = 2}$

$y + 5 = -7$
$\boxed{y = -12}$

c) $|3x| + 9 = 6$

$|3x| = -3$

$\boxed{\text{no solution!}}$

absolute value cannot be negative.

d) $2|z + 2| = 16$

$|z + 2| = 8$

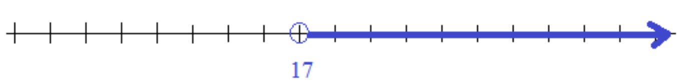
$z + 2 = 8$
$\boxed{z = 6}$

$z + 2 = -8$
$\boxed{z = -10}$

10) Solve the following: $(x + 3) + 4 < 2(x - 5)$
Write answer in *interval notation*; Graph the solution.

$x + 7 < 2x - 10$
$17 < x$

$\boxed{(17, \infty)}$



Math 002 Review Practice

SOLUTIONS

11) Expand:

a) $(2x-4)^2$

$(2x-4)(2x-4) =$

$4x^2 - 8x - 8x + 16$

$\boxed{4x^2 - 16x + 16}$

b) $(x+3)(x^2+4x-5)$

(x distributed) $x^3 + 4x^2 - 5x$

(3 distributed) $3x^2 + 12x - 15$

$\boxed{x^3 + 7x^2 + 7x - 15}$

12) Given the polynomial $4x^3 - 3x^5 + 2x - 1$

a) What is the degree of the polynomial? the (largest) degree is $\boxed{5}$

b) Arrange the terms in descending order. $\boxed{-3x^5 + 4x^3 + 2x - 1}$

c) What is the leading coefficient? $\boxed{-3}$

d) Evaluate the polynomial at x = 1 $4(1)^3 - 3(1)^5 + 2(1) - 1 = \boxed{2}$

13) Factor:

a) $4 - 9x^2$

(difference of squares)

$\boxed{(2+3x)(2-3x)}$

b) $2y^2 + 5y - 7$

factors of $2y^2$: y and 2y

factors of 7 : 1 and 7

(2y)(y)

$\boxed{(2y+7)(y-1)}$

c) $3x^2 + 15x + 12$

greatest common factor is 3:

$3(x^2 + 5x + 4)$

then, factor the trinomial:

$\boxed{3(x+1)(x+4)}$

14) Solve:

a) $x^2 + 5x = -4$

$x^2 + 5x + 4 = 0$

$(x+1)(x+4) = 0$

$\boxed{x = -1, -4}$

b) $x^3 - 4x = 0$

$x(x^2 - 4) = 0$

$x(x+2)(x-2) = 0$

$\boxed{x = 0, 2, -2}$

c) $x^2 + 3x - 7 = 0$

use quadratic formula:

a = 1

b = 3

c = -7

$$\frac{-3 \pm \sqrt{9 - 4(1)(-7)}}{2(1)}$$

$$\boxed{x = \frac{-3 \pm \sqrt{37}}{2}}$$

15) Solve for m:

a) $y = \frac{Lm}{r}$

$yr = Lm$

$\boxed{\frac{yr}{L} = m}$

b) $5s - (2m+3) = Q$

$-(2m+3) = Q - 5s$

$2m + 3 = 5s - Q$

$2m = 5s - Q - 3$

$$\boxed{m = \frac{5s - Q - 3}{2}}$$

Math 002 Review Practice

SOLUTIONS

16) What are the zeros of the function $f(x) = 3x^2 + 19x + 20$?

set function equal to zero (and factor): $(3x + \quad)(x + \quad) = 0$

factors of 20: 4/5 1/20 2/10

$(3x + 4)(x + 5) = 0$

$\boxed{x = -4/3, -5}$

17) A water balloon is launched off a balcony with an initial velocity of 64 ft/second. It's height in feet, h(t), at t seconds is given by the function:

$$h(t) = -16t^2 + 64t + 96$$

a) What is the height of the balcony? $h(0) = -16(0)^2 + 64(0) + 96 = \boxed{96 \text{ feet}}$ (balloon at t = 0)

b) How high is the balloon at 2 seconds? $h(t) = -16(2)^2 + 64(2) + 96 = \boxed{160 \text{ feet}}$

c) When does the balloon hit the ground?

set height h(t) = 0

$-16t \;\; + 64t + 96 = 0$

$t^2 - 4t - 6 = 0$

$t = \dfrac{4 \pm \sqrt{16 + 24}}{2} = \boxed{2 + \sqrt{10}}$ $\boxed{\text{approx. 5.16 seconds}}$

(time) t cannot be less than 0

18) Simplify

a) $\dfrac{m^2 + 4m + 3}{3m + 12} \cdot \dfrac{m + 4}{m^2 - 9}$

$\dfrac{(m + 1)\cancel{(m + 3)}}{3\cancel{(m + 4)}} \cdot \dfrac{\cancel{m + 4}}{\cancel{(m + 3)}(m - 3)}$

$\boxed{\dfrac{m + 1}{3(m - 3)}}$

b) $\dfrac{x^2 - 4}{2x} \div \dfrac{x^2 - x - 6}{4x + 10}$

$\dfrac{(x - 2)(x + 2)}{2x} \div \dfrac{(x - 3)(x + 2)}{2(2x + 5)}$

(invert and multiply)

$\dfrac{(x - 2)\cancel{(x + 2)}}{\cancel{2}x} \cdot \dfrac{\cancel{2}(2x + 5)}{(x - 3)\cancel{(x + 2)}} = \boxed{\dfrac{(x - 2)(2x + 5)}{x(x - 3)}}$

19) Solve $\dfrac{s}{s + 5} + \dfrac{4}{s - 1} = \dfrac{2s + 26}{s^2 + 4s - 5}$

$\dfrac{s(s - 1)}{(s + 5)(s - 1)} + \dfrac{4(s + 5)}{(s - 1)(s + 5)} = \dfrac{2s + 26}{(s + 5)(s - 1)}$

$s^2 - s + 4s + 20 = 2s + 26$

$s^2 + s - 6 = 0$

$(s + 3)(s - 2) = 0$

$\boxed{s = -3, 2}$

$\dfrac{-3}{2} + \dfrac{4}{-4} = \dfrac{20}{-8}$

$\dfrac{10}{-4} = \dfrac{20}{-8}$ ✓

$\dfrac{2}{7} + \dfrac{4}{1} = \dfrac{30}{7}$

$\dfrac{30}{7} = \dfrac{30}{7}$ ✓

20) Answer (leaving answers in $a + bi$ form)

a) $3 + 5i - (2 - 3i)$

$\boxed{1 + 8i}$

b) $(5 + 3i)(2 + i)$ (FOIL)

$10 + 5i + 6i + 3i^2$

$10 + 11i + 3(-1)$

$\boxed{7 + 11i}$

Math 002 Review Practice

SOLUTIONS

21) Rationalize the denominator:

a) $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

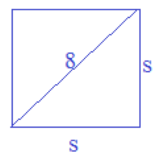
$\boxed{\frac{2\sqrt{3}}{3}}$

(use conjugate)

b) $\frac{3}{5+\sqrt{6}} \cdot \frac{5-\sqrt{6}}{5-\sqrt{6}} = \frac{3(5-\sqrt{6})}{25+5\sqrt{6}-5\sqrt{6}-6}$

$= \boxed{\frac{15-3\sqrt{6}}{19}}$

22) The diagonal of a square is 8 feet. What is the length of each side?



(pythagorean theorem)

$s^2 + s^2 = (8)^2$

$2s^2 = 64$

$s = \sqrt{32} = \boxed{4\sqrt{2}\ \text{feet}}$

23) $g(x) = 3x^2 - 30x + 63$

a) Find $g(0)$ $\quad 3(0)^2 - 30(0) + 63 = \boxed{63}$

b) Find $g(n+1)$ $\quad 3(n+1)^2 - 30(n+1) + 63 = 3n^2 + 6n + 3 - 30n - 30 + 63$

$\boxed{= 3n^2 - 24n + 36}$

c) What is the vertex of the graph $y = g(x)$?

vertex: $(-b/2a,\ g(-b/2a))$ $\quad \frac{-b}{2a} = \frac{-(-30)}{2(3)} = 5$ $\quad g(5) = 75 - 150 + 63 = -12$ $\quad$ $\boxed{\text{vertex: } (5, -12)}$

d) What are the zeros of the function?

$3x^2 - 30x + 63 = 0$

$3(x^2 - 10x + 21) = 0$

$3(x-3)(x-7) = 0$

$\boxed{x = 3, 7}$

24) Solve: $\sqrt{5x+54} = x + 8$ (Identify extraneous solutions)

(square both sides)

$5x + 54 = (x+8)^2$

$5x + 54 = x^2 + 16x + 64$

$x^2 + 11x + 10 = 0$

$(x+1)(x+10) = 0$

$\boxed{x = -1,}\ -10$

check solutions: $\sqrt{5(-1)+54} = (-1) + 8$

$7 = 7$ ✓

$\sqrt{5(-10)+54} = (-10) + 8$

$2 = -2$ extraneous

25) Sketch a graph of the following: $f(x) = -2(x-1)^2 + 4$

Label the vertex and 2 other points.

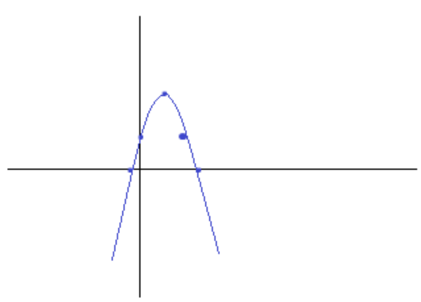
$\boxed{\text{vertex: } (1, 4)}$

$f(0) = -2(0-1)^2 + 4 = 2$

$\boxed{(0, 2)}$

$f(2) = -2(2-1)^2 + 4 = 2$

$\boxed{(2, 2)}$



$-2(x-1)^2 + 4 = 0$

$-2(x-1)^2 = -4$

$(x-1)^2 = 2$

$x - 1 = \pm\sqrt{2}$

$\boxed{(1+\sqrt{2}, 0)\quad (1-\sqrt{2}, 0)}$

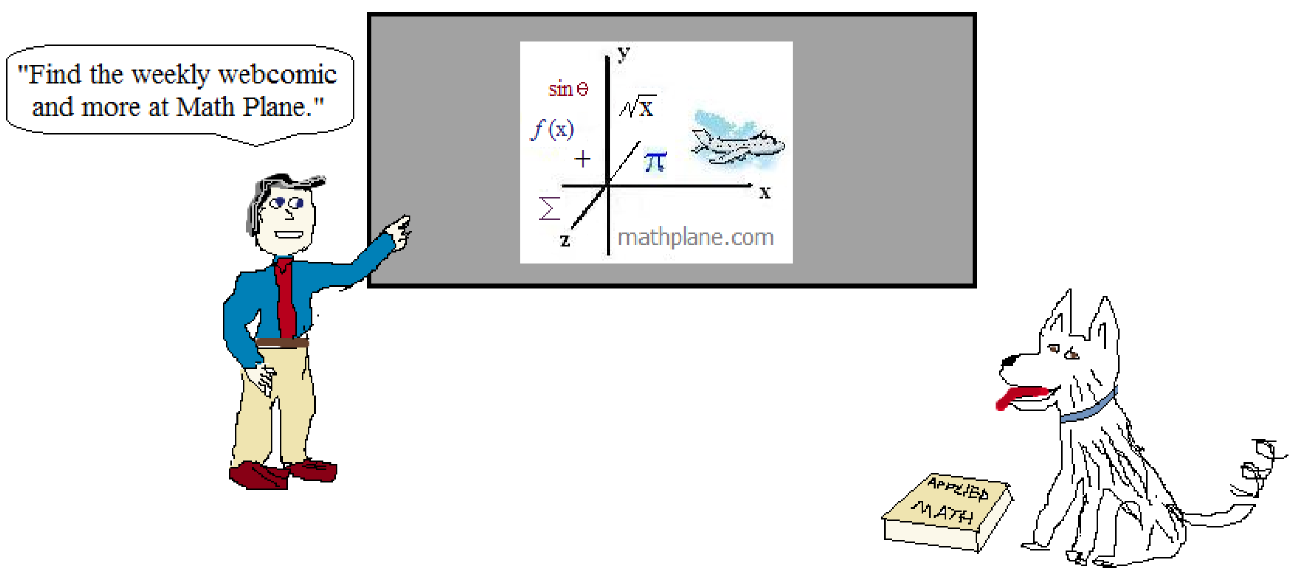
Thanks for visiting the site. (Hope it helped!)

If you have questions, suggestions, or requests, contact us.

Cheers,

Mathplane.com

(Facebook, Pinterest, Teacherspayteachers, and Google +)



ONE MORE QUESTION:

$$12 + 3(4 + 7) \div 3(5) =$$

Order of Operations:

$$12 + 3(4 + 7) \div 3(5)$$

$$12 + 33 \div 3 \times 5$$

$$12 + 11 \times 5$$

$$12 + 55 = \boxed{67}$$

NOT $\cancel{12 + 33 \div 15 = 3}$

NOT $\cancel{12 + 33/15}$