

# Algebra 1

Mid-year Exam Review

Name: \_\_\_\_\_

1. Perform the operations indicated.

a)  $4\frac{2}{3} - 1\frac{11}{12}$

$$\frac{14}{3} - \frac{23}{12}$$

$$\frac{56}{12} - \frac{23}{12}$$

$$\frac{33}{12}$$

$$\boxed{\frac{11}{4}}$$

b)  $\frac{4}{3} \cdot \frac{5}{2} = \frac{20}{6} = \frac{10}{3}$

$$\boxed{\frac{11}{4}}$$

c) Divide:

$$85.72 \div 1.2$$

$$\begin{array}{r} 71.43 \\ 1.2 \overline{) 85.72} \\ \underline{-84} \phantom{00} \\ 17 \phantom{00} \\ \underline{-12} \phantom{00} \\ 52 \phantom{00} \\ \underline{-48} \phantom{00} \\ 40 \phantom{00} \end{array}$$

d) Multiply:

$$2.8 \times 7.351$$

$$\begin{array}{r} 7.351 \\ \times 2.8 \\ \hline 58808 \\ 147020 \\ \hline \boxed{20.5828} \end{array}$$

e) Simplify:

$$\frac{2}{3} \left( \frac{1}{4} - 2\frac{4}{5} \right)$$

$$\frac{2}{3} \left( \frac{1}{4} - \frac{14}{5} \right)$$

$$\frac{2}{3} \left( \frac{5}{20} - \frac{56}{20} \right)$$

$$\frac{2}{3} \cdot \frac{-51}{20} = \frac{-102}{60} = \frac{-17}{10}$$

$$\boxed{\frac{-17}{10}}$$

f) Simplify:

$$\frac{-3}{5} \cdot \frac{4}{3} \cdot \frac{2}{5} \cdot \frac{-6}{7}$$

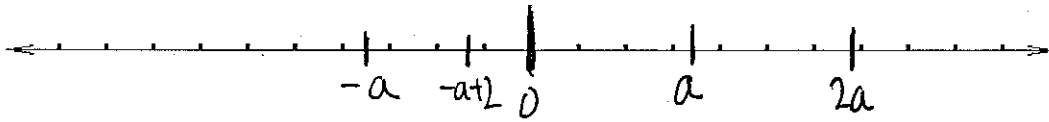
$$\frac{-12}{5} - \frac{2}{5} \cdot \frac{7}{-15}$$

$$\frac{-12}{5} - \frac{7}{-15}$$

$$\frac{-36}{15} + \frac{7}{15}$$

$$\boxed{\frac{-29}{15}}$$

2. a)  $a$  is a number which lies between  $-3$  and  $-4$ . Plot and label  $a$  on the number line below.



- b) Plot and label  $2a$  on the number line above.  
 c) Plot and label  $-a$  on the number line above.  
 d) Plot and label  $2-a$  on the number line above.  
 ||  
 $-a+2$

3. Simplify the following:

a)  $\frac{3-2 \cdot (4+1)}{(3-2) \cdot 4+1}$

$$\frac{3-2 \cdot 5}{1 \cdot 4+1}$$

$$\frac{3-10}{4+1}$$

$$\boxed{\frac{-7}{5}}$$

b)  $18-12 \div (2+4) \cdot 3$

$$18-12 \div 6 \cdot 3$$

$$18-2 \cdot 3$$

$$18-6$$

$$\boxed{12}$$

4. Evaluate when  $x = 4$  and  $y = -3$ .

a)  $\frac{|-x+y|}{x-y}$

$$\frac{|-4+(-3)|}{4-(-3)}$$

$$\frac{|-7|}{7}$$

$$\boxed{1}$$

b)  $\frac{20x}{5x(x-y)}$

$$\frac{20(4)}{5(4)(4-(-3))}$$

$$\frac{80}{20 \cdot 7}$$

$$\boxed{\frac{4}{7}}$$

5. Put in order from least to greatest:  $\frac{12}{5}$ ,  $\sqrt{11}$ , 2.42,  $\frac{7}{3}$ ,  $\frac{-74}{31}$  *2.4, 73, 2.42, 2.33..., negative*

$$\frac{-74}{31}, \frac{7}{3}, \frac{12}{5}, 2.42, \sqrt{11}$$

6. Add sets of parentheses to make all of the following equations true.

a.  $(3+4) \times (6-2) = 28$

b.  $5 \times (3 - (6-3)) = 0$

c.  $5 \times 3 - (6-3) = 12$

d.  $45 - (4 \times 5 + 1) = 24$

e.  $45 - (4 \times (5+1)) = 21$

7. Expand and simplify:

a)  $3(n-4) + 2(5-n)$

$$3n - 12 + 10 - 2n$$

$$n - 2$$

b)  $6(x-4) - (6+x)$

$$6x - 24 - 6 - x$$

$$5x - 30$$

c)  $\frac{-1}{3}(27x-15)$

$$-9x + 5$$

d)  $\frac{-2}{5}(25x-15)$

$$-10x + 6$$

8. Solve:

a)  $3(n-4) - (5-n) = -2(5-3n)$

$$3n - 12 - 5 + n = -10 + 6n$$

$$4n - 17 = 6n - 10$$

$$-2n = 7$$

$$n = \frac{-7}{2}$$

c)  $4(3x+5) = \frac{2x+3}{4} \cdot \frac{4}{1}$

$$12x + 20 = 2x + 3$$

$$10x = -17$$

$$x = \frac{-17}{10}$$

b)  $\left(-\frac{2}{3}m + 3 = \frac{1}{2}\right) \frac{6}{1}$

$$-4m + 18 = 3$$

$$-4m = -15$$

$$m = \frac{15}{4}$$

d)  $\left(\frac{3}{4}x - \frac{3}{10} = \frac{5}{8}\right) \frac{40}{1}$

$$30x - 12 = 25$$

$$30x = 37$$

$$x = \frac{37}{30}$$

9. Evaluate...

a) ...when  $a = \frac{2}{3}$

$$3a^2 - 1$$

$$3\left(\frac{2}{3}\right)^2 - 1$$

$$\frac{3}{1} \cdot \frac{4}{9} - 1$$

$$\frac{4}{3} - \frac{3}{3}$$
$$\frac{1}{3}$$

b) ...when  $a = -2$

$$\frac{4}{5} - a^2$$

$$\frac{4}{5} - (-2)^2$$

$$\frac{4}{5} - 4$$

$$\frac{4}{5} - \frac{20}{5}$$

$$\frac{-16}{5}$$

10. Simplify:

a)  $\left(\frac{8}{15}mn^2\right)\left(\frac{-9}{4}m^5\right)$

$\frac{2\cancel{8}}{\cancel{15}} \cdot \frac{-9\cancel{3}}{\cancel{4}} \cdot m \cdot m^5 \cdot n^2$

$\frac{-6}{5}m^6n^2$

b)  $5xy \cdot (-3x^3)^2$

$5xy \cdot 9x^6$

$45x^7y$

c)  $5(3m^2n^3)^2$

$5(9m^4n^6)$

$45m^4n^6$

d)  $(2r^5)^3$

$8r^{15}$

11. Fill in the blanks.

a)  $\frac{8mn^3}{2m^2n^3} = \left[ \frac{4}{m} \right]$

b)  $4x^4y = \left[ 4xy \right] \cdot x^3$

c)  $\frac{4p^3z^5}{2p^2z^3} = 2pz^2$

d)  $\frac{[15x^2y^5]}{5x^2y^3} = 3y^2$

12. Multiply out and simplify:

a)  $(5x-2)^2$

$$(5x-2)(5x-2)$$
$$25x^2 - 10x - 10x + 4$$
$$\boxed{25x^2 - 20x + 4}$$

b)  $(y-3)(y^2-3y-1)$

$$y(y^2-3y-1) - 3(y^2-3y-1)$$
$$y^3 - 3y^2 - y - 3y^2 + 9y + 3$$
$$\boxed{y^3 - 6y^2 + 8y + 3}$$

c)  $(6w+3)(6w-3)$

$$\boxed{36w^2 - 9}$$

d)  $-2(x+2)^2$

$$-2[(x+2)(x+2)]$$
$$-2(x^2 + 4x + 4)$$
$$\boxed{-2x^2 - 8x - 8}$$

13. Factor. (Use scratch paper to do trial and error!)

a)  $x^2 + 9x + 20$

$$\boxed{(x+4)(x+5)}$$

b)  $x^2 - 12x + 20$

$$\boxed{(x-2)(x-10)}$$

c)  $y^2 - 8y - 20$

$$\boxed{(y-10)(y+2)}$$

d)  $w^2 - 49$

$$\boxed{(w+7)(w-7)}$$

e)  $2x^2 - 6x - 36$

$$2(x^2 - 3x - 18)$$
$$\boxed{2(x-6)(x+3)}$$

f)  $-3x^2 + 9x + 12$

$$-3(x^2 - 3x - 4)$$
$$\boxed{-3(x-4)(x+1)}$$

g)  $3c^2 + 10c + 8$

$$\boxed{(3c+4)(c+2)}$$

g)  $-2d^2 + 50$

$$-2(d^2 - 25)$$
$$\boxed{-2(d+5)(d-5)}$$

14. Solve.

a)  $(3x-17)(8-2x)=0$

$$3x-17=0 \text{ or } 8-2x=0$$

$$3x=17$$

$$x = \frac{17}{3} \text{ or } x = 4$$

b)  $2x^2+3x-5=0$

$$(2x+5)(x-1)=0$$

$$2x+5=0 \text{ or } x-1=0$$

$$2x=-5$$

$$x = -\frac{5}{2} \text{ or } x = 1$$

c)  $(x+1)(x+3)=24$

$$x^2+4x+3=24$$

$$x^2+4x-21=0$$

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

$$x+7=0 \text{ or } x-3=0$$

$$x = -7 \text{ or } x = 3$$

d)  $y(y-1)=y(2y-4)$

$$y^2-y=2y^2-4y$$

$$0=y^2-3y$$

$$0=y(y-3)$$

$$y=0 \text{ or } y-3=0$$

$$y=0 \text{ or } y=3$$

e)  $8x^2+12x+4=0$

$$2x^2+3x+1=0$$

$$(2x+1)(x+1)=0$$

$$2x+1=0 \text{ or } x+1=0$$

$$2x=-1$$

$$x = -\frac{1}{2} \text{ or } x = -1$$

f)  $6x^2+15x+9=0$

$$6x^2+15x+9=0$$

$$2x^2+5x+3=0$$

$$(2x+3)(x+1)=0$$

$$2x+3=0 \text{ or } x+1=0$$

$$2x=-3$$

$$x = -\frac{3}{2} \text{ or } x = -1$$

15. Simplify.

a)  $\frac{(x+4)(x-5)}{5(x+3)} \div \frac{(x-5)}{5(x+4)}$

$$\frac{\cancel{(x+4)}\cancel{(x-5)}}{\cancel{5}(x+3)} \cdot \frac{\cancel{5}\cancel{(x+4)}}{\cancel{x}5}$$

$$\boxed{\frac{(x+4)^2}{x+3}}$$

b)  $\frac{3x+9}{x+3} \cdot \frac{2x^2+2x+2}{6x^2+6x+6}$

$$\frac{\cancel{3}\cancel{(x+3)}}{\cancel{x+3}} \cdot \frac{\cancel{2}\cancel{(x^2+x+1)}}{\cancel{6}(x^2+x+1)}$$

$$\boxed{1}$$

c)  $\frac{3x+9}{x^2-4} \cdot \frac{x^2+5x+6}{x^2+6x+9}$

$$\frac{\cancel{3}\cancel{(x+3)}}{\cancel{(x+2)}(x-2)} \cdot \frac{\cancel{(x+2)}\cancel{(x+3)}}{\cancel{(x+3)}(x+3)}$$

$$\boxed{\frac{3}{x-2}}$$

d)  $\frac{x^2+2x-8}{x+4} \div (x^2-4)$

$$\frac{\cancel{(x+4)}\cancel{(x-2)}}{\cancel{x+4}} \cdot \frac{1}{\cancel{(x+2)}(x-2)}$$

$$\boxed{\frac{1}{x+2}}$$

16. The sum of a number and four is the same as the product of the number and four. Write and solve an equation to find the number.

$$n+4 = 4 \cdot n$$

$$4 = 3n$$

$$\boxed{n = \frac{4}{3}}$$

17. The sum of three consecutive even numbers is 246.  
Write and solve an equation to find the smallest number.

$$n + (n+2) + (n+4) = 246$$

$$3n + 6 = 246$$

$$3n = 240$$

$$\boxed{n = 80}$$

18. The sum of the squares of two consecutive positive whole numbers is 113.  
Write and solve an equation to find the smaller number. (This one is harder.)

$$n^2 + (n+1)^2 = 113$$

$$n^2 + n^2 + 2n + 1 = 113$$

$$2n^2 + 2n - 112 = 0$$

$$n^2 + n - 56 = 0$$

$$(n+8)(n-7) = 0$$

$$n+8=0 \text{ or } n-7=0$$

$$\cancel{n=-8} \text{ or } \boxed{n=7}$$

19. If you square a whole number, you get 3136. Use process of elimination to find the number.

must end in 4 or 6.

$$\begin{array}{r} \cancel{54} \\ \times \cancel{54} \\ \hline \cancel{216} \\ \cancel{2700} \\ \hline \cancel{2916} \end{array}$$

$$\begin{array}{r} 56 \\ \times 56 \\ \hline 336 \\ 2800 \\ \hline 3136 \\ \Rightarrow \boxed{56} \end{array}$$

20. Find a logical thirtieth term for each sequence.

a) 6, 9, 12, 15, 18, 21, 24, ...

$$6 + 29 \times 3 = 93$$

b) 5, 9, 13, 17, 21, ...

$$5 + 29 \times 4 = 121$$

c) 6, 12, 20, 30, 42, ...

2-3, 3-4, 4-5, 5-6, ..., 31-32

$$992$$

$$\begin{array}{r} 31 \\ 32 \\ \hline 62 \\ 930 \\ \hline 992 \end{array}$$

21. There are 12 players on the Bears and 12 players on the Tigers.

a) If each player on the Bears shakes hands with each player on the Tigers, how many handshakes take place?

$$12 \times 12 = 144$$

b) If instead each player on the Bears shakes hands with each other player on the Bears, how many handshakes take place?

$$\frac{12 \times 11}{2} = 66$$

22. Write all combinations of <sup>nickels,</sup> dimes, and quarters that add up to \$0.75 ~~or less~~.

Q	D	N
3	0	0
2	2	1
2	1	3
2	0	5
1	5	0
1	4	2
1	3	4
1	2	6
1	1	8
1	0	10

Q	D	N
0	7	1
0	6	3
0	5	5
0	4	7
0	3	9
0	2	11
0	1	13
0	0	15

(I changed the problem.)