GRADE 10 INTRO TO APPLIED & PRE-CALCULUS

EXTRA PRACTICE

FACTORS AND PRODUCTS

1. Write 1022 as a product of its prime factors.

2. Determine the greatest common factor of 64, and 120. Make sure you show your work.

3. Determine the least common multiple of 9, and 12. Make sure you show your work.

4. Two marching bands are to be arranged in rectangular arrays with the same number of columns. One band has 54 members, the other has 42 members. What is the greatest number of columns in the array?

5. What are the dimensions of the smallest square that could be tiled using an 18 cm by 24 cm tile?

6. Find the edge length of a cube with a volume of 1728. Show your work for full marks.

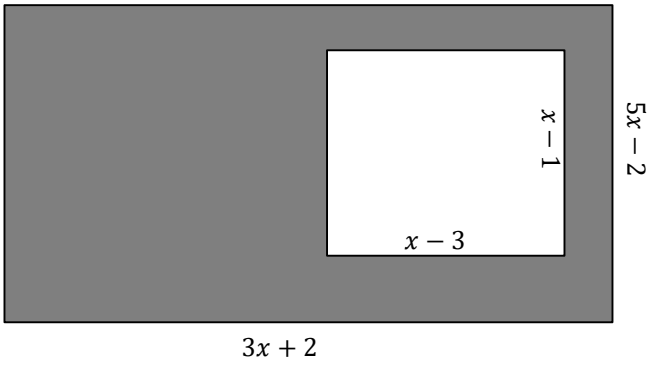
7. Expand and simplify the following:

   a) $(3x - 2)(x + 4)$

   b) $(x - 1)^3$

   c) $3x(2x - 4) - (x + 1)^2$

d) Determine a simplified expression for the area of shaded region.



8. Factor the following:

a) $x^2 - 5x - 14$

b) $3x^2y^3 - x^2y^2$

c) $2x^2 - 11xy - 6y^2$

d) $12x^2 + 2x - 4$

e) $9x^4 - 81y^4$

f) $x^4 - 3x^2 - 4$

ANSWER KEY: FACTORS AND PRODUCTS

1. $1022 = 2 \cdot 7 \cdot 73$
2. $GCF = 2^3 = 8$
3. $LCM = 36$
4. $GCF = 6\ columns$
5. $72\ cm\ by\ 72\ cm$
6. $\sqrt[3]{1728} = 12$
7. a) $3x^2 + 10x - 8$ b) $x^3 - 3x^2 + 3x - 1$ c) $5x^2 - 14x - 1$ d) $14x^2 + 8x - 7$
8. a) $(x-7)(x+2)$ b) $x^2y^2(3y-1)$ c) $(2x+y)(x-6y)$ d) $2(3x+2)(2x-1)$
   e) $9(x^2-3y^2)(x^2+3y^2)$ f) $(x^2+1)(x+2)(x-2)$

ROOTS AND POWERS

9. Simplify and leave only positive exponents:

   a) $2x^{-3}$

   b) $4^{-\frac{1}{2}}$

   c) $(2x^2y^3)(4x^{-2}y^4)^2$

   d) $\frac{(3xy)^0(5x^2y^3)^2}{50xy}$

   e) $\left(\frac{27x^{-2}y^4}{3xy^{-1}}\right)^{-\frac{1}{2}}$

10. Simplify the following radicals:

   a) $\sqrt{208}$

   b) $\sqrt[3]{108}$

   c) $\sqrt{24x^5y^4}$

11. Change the following mixed radicals to an entire radical.

   a) $4\sqrt{5}$

   b) $2\sqrt[4]{3}$

ANSWER KEY: ROOTS AND POWERS

9. a) $\frac{2}{x^3}$ b) $\frac{1}{2}$ c) $\frac{32y^{11}}{x^2}$ d) $\frac{x^3y^5}{2}$ e) $\frac{x^{\frac{3}{2}}}{3y^{\frac{5}{2}}}$

10. a) $4\sqrt{13}$ b) $3\sqrt[3]{4}$ c) $2x^2y^2\sqrt{6x}$

11. a) $\sqrt{80}$ b) $\sqrt[4]{48}$

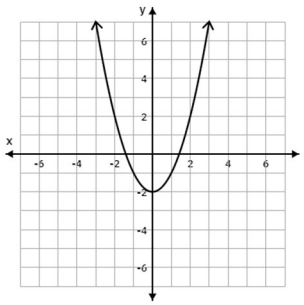
RELATIONS AND FUNCTIONS

12. For each of the following below, determine:

- Domain (in set notation)
- Range (in set notation)
- y-intercept
- state whether it is a function or not, explain your reasoning

a) $\{(3,4),(-2,-1),(4,-6),(-2,2)\}$

b)



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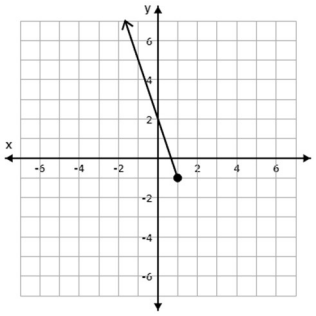

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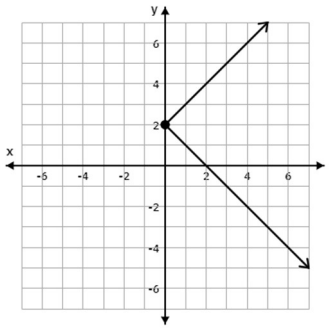

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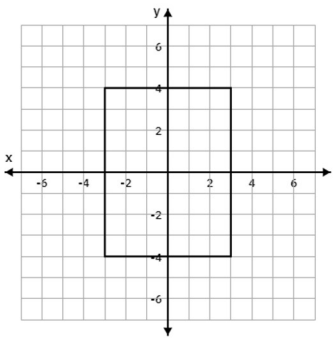
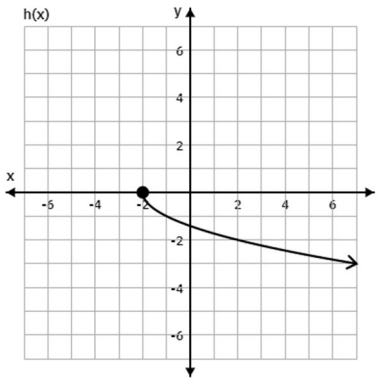


13. Given the following three functions:

$f(x) = 3x - 5 \quad g(x) = x^2 - 4$



Find:

a) $f(3)$

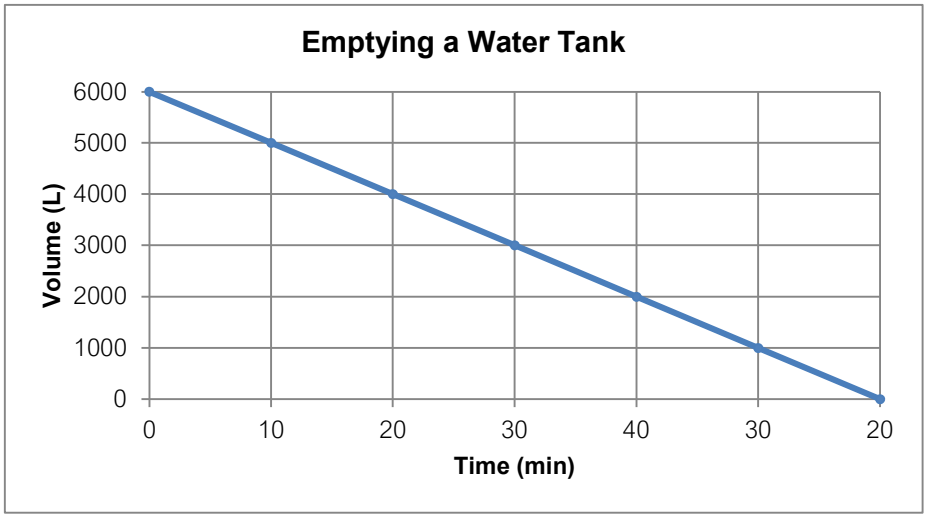
b) $g(0)$

c) $h(2)$

d) $f(a)$

e) $f(-1) + g(2)$

14.



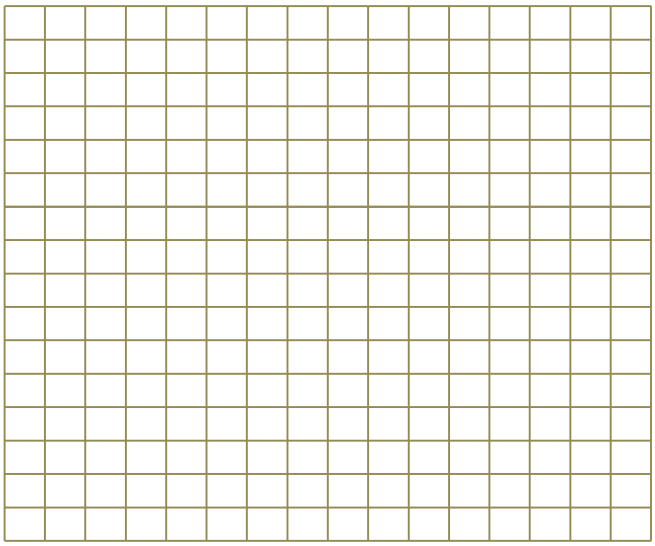
a) Determine the independent and dependent variables.

b) At 30 minutes, what is the volume of water remaining in the tank?

c) What is the rate of the change of the graph? What does it represent?

15. Emma is an insurance sales person. She earns a base salary of $200 per week, plus $10 for every policy she sells. Generate some data, and graph the relation. Remember to include all titles, and labeling.

# of policies sold	0	1	2	3	4
salary					



a) Find the slope of the line.

b) What does the slope of the line represent?

c) Write an equation to represent the linear function.

d) If Emma sells 10 insurance policies, how much is her salary? Use the formula from (c) to answer the question.

ANSWER KEY: RELATIONS AND FUNCTIONS

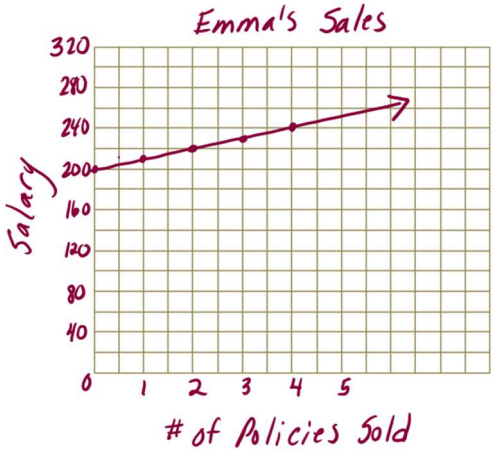
12. a) $D: x = -2, 3, 4;\ R: y = -6, -1, 2, 4;\ y - int: none;\ Not\ a\ function, -2\ has\ two\ y - values$
b) $D: x \in \mathbb{R};\ R: y \geq -2;\ y - int: -2;\ Function - passes\ the\ vertical\ line\ test$
c) $D: x \leq 1; R: y \geq -1; y - int: 2;\ Function - passes\ the\ vertical\ line\ test$
d) $D: x \leq 0;\ R: y \in \mathbb{R};\ y - int: 0;\ Not\ a\ function, fails\ vertical\ line\ test$
e) $D: -3 \leq x \leq 3;\ R: -4 \leq y \leq 4;\ y - int: -4, 4;\ Not\ a\ function, fails\ the\ vertical\ line\ test$

13. a) 4 b) -4 c) -2 d) $3a - 5$ e) -8

14. a) Independent – Time, Dependent – Volume b) 3000 L c) $m = -300$, Loss of 300 L every min

15.

# of policies sold	0	1	2	3	4
salary	200	210	220	230	240



a) $m = 10$
b) Salary earned per policy
c) $S = 10p + 200$
d) $S = \$300$

LINEAR FUNCTIONS

16. Calculate the distance between (-5, 4) and (1, -9). Leave answer as a simplified radical.

17. Find the midpoint between (1, 3) and (-5, 10).

18. If the midpoint of AB is (5, -4) and A is (0, -6), find the coordinates of point B.

19. Find the slope of the line that goes through the points (10, 12) and (-6, 9).

20. Re-write the following linear equations in slope intercept form:

    a) $y - 3 = \frac{2}{3}(x + 4)$

    b) $3x - 4y + 8 = 0$

    c) $3x - y = \frac{4}{5}$

21. Find the equation of the line that passes through (5, 8) and has a slope of $\frac{3}{2}$.
    Answer in general form.

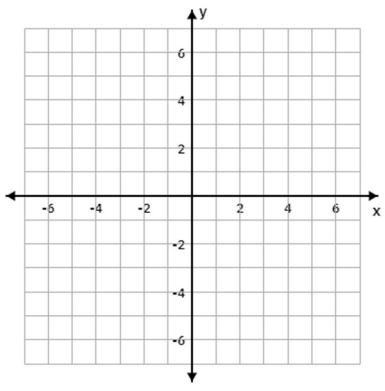
22. Find the equation of the line that passes through the points (-1, 6) and (5, -4).
    Answer in slope intercept form.

23. Find the equation of the line that passes through the point (3, 7) and has a y-intercept of -2.
    Answer in general form.

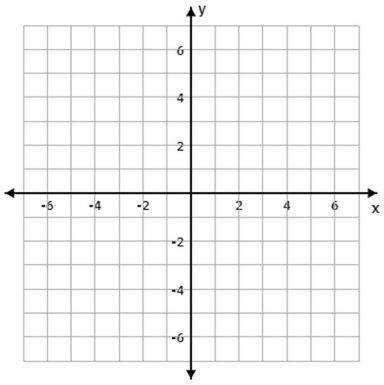
24. Find the equation of the line that is perpendicular to the line $4x - y + 10 = 0$ and has an x-intercept of 7. ***Answer in slope intercept form.***

25. Find the equation of the line that is parallel to the line $y - 3 = \frac{1}{2}(x + 2)$ and passes through the point (4, -6). ***Answer in general form.***

26. Graph the linear function $y = -\frac{4}{5}x + 4$ using the intercepts method of graphing.



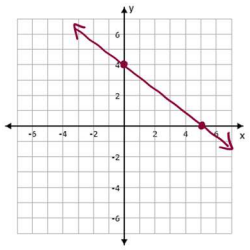
27. Graph the linear function $3x - 4y + 16 = 0$ using the slope intercept method of graphing.

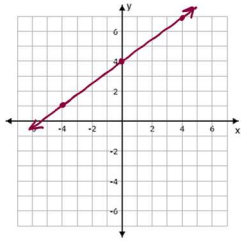


28. Determine the x and y-intercepts for $5x - 3y + 12 = 0$.

ANSWER KEY: LINEAR FUNCTIONS

16. $\sqrt{205}$
17. $\left(-2, \frac{13}{2}\right)$
18. $(10, -2)$
19. $\frac{3}{16}$
20. a) $y = \frac{2}{3}x + \frac{17}{3}$ b) $y = \frac{3}{4}x + 2$ c) $y = 3x - \frac{4}{5}$
21. $3x - 2y + 1 = 0$
22. $y = -\frac{5}{3}x + \frac{13}{3}$
23. $3x - y - 2 = 0$
24. $y = -\frac{1}{4}x + \frac{7}{4}$
25. $x - 2y - 16 = 0$
26.
27.



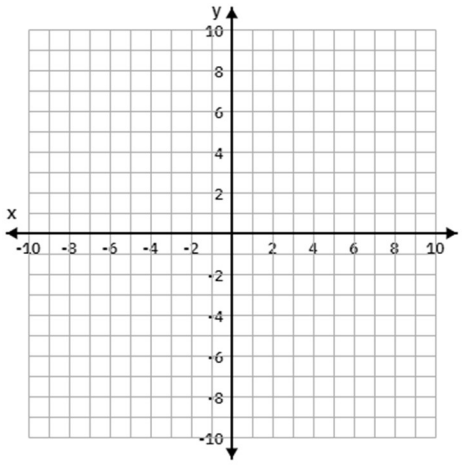


28. $x - int$: $-\frac{12}{5}$; $y - int$: 4

SYSTEMS OF LINEAR EQUATIONS

29. Solve the system of linear equations by graphing.

$x - y = -2$
$4x + 2y = 16$



30. Solve the system of linear equations using substitution.

$3x + y = 3$
$2x + 3y = -5$

31. Solve the system of linear equations using elimination.

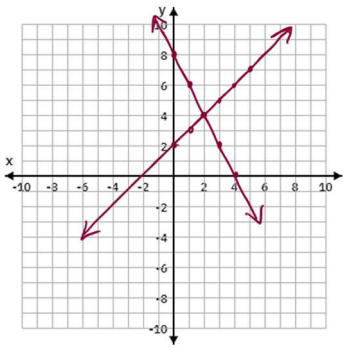
$5x + 2y = 5$
$3x - 4y = -23$

32. A play-off football game drew 36 500 fans. Depending on seat location, the ticket prices were \$35 and \$20. The total revenue from the ticket sales was \$940 000. How many \$35 tickets and how many \$20 tickets were sold?

33. Three footballs and one soccer ball cost $155. Two footballs and three soccer balls cost $220. Determine the cost of one football and the cost of one soccer ball.

ANSWER KEY: SYSTEMS OF LINEAR EQUATIONS

29. $(2, 4)$



30. $(2, -3)$

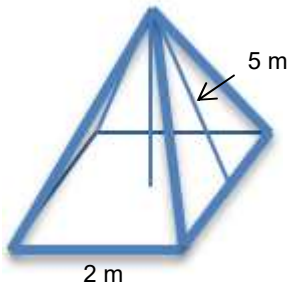
31. $(-1, 5)$

32. $20 Tickets – 14 000 sold, $35 Tickets – 22 500 sold

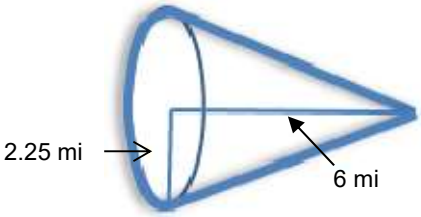
33. Footballs cost $35, Soccer Balls costs $50

MEASUREMENT

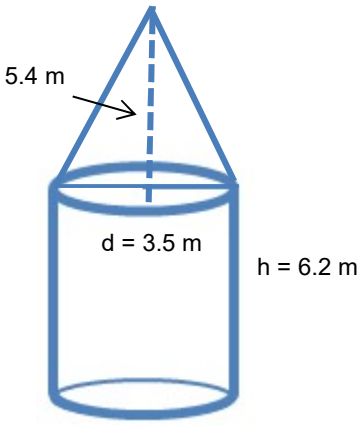
34. Calculate the surface area of this pyramid:



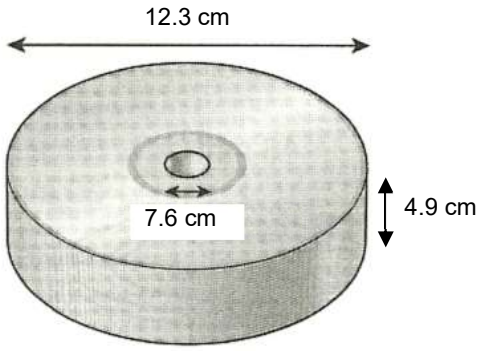
35. Calculate the surface area of this cone:



36. Determine the surface area for the following composite figure.



37. A roll of duct tape has the following dimensions. There is a cylindrical hole in the centre of the shape. Calculate the volume of the tape.



38. Convert the following measurements:

a) 48 inches to _____ft

b) 72 ft to _____m

c) 100 cm to _____m

d) 74 inches to _____cm

ANSWER KEY: MEASUREMENT

34. 24 m^2

35. 61.2 mi^2

36. 109.00 m^2

37. 359.95 cm^3

38. a) 4 ft b) 21.95 m c) 1 m d) 187.96 cm

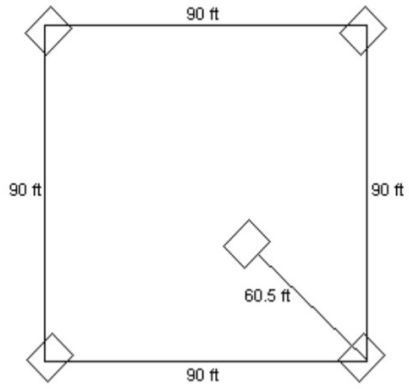
TRIGONOMETRY

39. A 30-m long line is used to hold a helium weather balloon. Due to a breeze, the line makes a 75° angle with the ground. Find the height of the balloon.

40. A fire department's longest ladder is 110 feet long, and the safety regulation states that they can use it for rescues up to 100 feet off the ground. What is the maximum safe angle of elevation for the rescue ladder?

41. From the foot of a building I look upwards at an angle of 22° to sight the top of a tree. From the top of the building, 150 meters above the tree top, I look down at an angle of depression of 50° to see the top of the tree.
    a. How tall is the tree?
    b. How far from the building is the tree?

42. A baseball diamond is actually just a square with each base 90 feet apart. If a pitcher (who is 60.5 feet from home plate) decides to turn around and throw the ball to second base, how far does he/she throw it?



ANSWER KEY: TRIGONOMETRY

39. 29.0 m

40. 65°

41. a) 50.85 m b) 125.86 m

42. 66.78 ft