

Course End Review

Grade 10: Academic Mathematics

Linear Systems:

- For each of the following linear equations place in $y = mx + b$ format.
(a) $-3x + 6y = 12$ (b) $4x - 3y = 15$
- Given $12x - 4y = 36$, state:
(a) x -intercept (b) y -intercept
(c) the slope
- Find the point of intersection for $\begin{cases} x - 5y = -10 \\ y = -3x + 18 \end{cases}$.
- Select which best describes the linear system: no solution, infinite solutions, or one solution.
(a) $\begin{cases} y = 5x - 6 \\ y = 6x + 5 \end{cases}$ (b) $\begin{cases} y = 7x - 4 \\ y = 7x + 11 \end{cases}$
(c) $\begin{cases} y = -3x - 2 \\ 9x + 3y = -6 \end{cases}$ (c) $\begin{cases} y = -2x \\ -2x + y = 0 \end{cases}$
- Given the linear equation $5x - 4y = 12$, state the slope that is:
(a) parallel (b) perpendicular
- For the given table of values state the value for the:
(a) first difference
(b) second difference

x	y
0	10
1	5
2	3
3	4
4	8
- Solve the following system of linear equations. Write the solution as an ordered pair.
(a) $\begin{cases} -2x - 7y = 7 \\ 3x + 10y = -8 \end{cases}$ (b) $\begin{cases} 3y = x - 9 \\ 2x - 3y = 15 \end{cases}$
(c) $\begin{cases} 5x - 3y = 15 \\ 10x - 6y = 75 \end{cases}$ (d) $\begin{cases} 4x - 3y = 20 \\ x + y = 6 \end{cases}$
- The sum of Natalie's age and Marixa's age is 48 years. Marixa is four years younger than Natalie. How old are Natalie and Marixa? Use algebraic modelling to solve this problem.
- The length of a rectangle is 19 m longer than the width. If the perimeter is 606 m, what are the dimensions of the rectangle?

Analytic Geometry:

10. Determine the length of the diameter of the circle whose endpoints are $(-5, 1)$ and $(-3, 4)$.
11. Determine the radius for each given circle:
- (a) $x^2 + y^2 = 25$ (b) $3x^2 + 3y^2 = 12$
(c) $x^2 + y^2 = 10$ (d) $(x - 3)^2 + (y + 4)^2 = 81$
12. State the midpoint given: $C(3, -6)$ and $D(-5, 10)$.
13. A quadrilateral has vertices at $D(4, -3)$, $E(9, -1)$, $F(13, -6)$, and $G(8, -8)$. Prove algebraically what type of quadrilateral is $DEFG$.
14. How would you verify that your solution to a system of equations is correct?
15. Given $\triangle ABC$ with vertices $A(-2, 3)$, $B(2, 1)$, and $C(-4, -1)$.
- (a) Determine whether it is a right triangle or not. Explain your answer algebraically.
(b) Determine if it is a scalene, an isosceles or an equilateral triangle. Explain your reasoning through algebra.
16. Given $(x - 1)^2 + (y + 2)^2 = 81$, state:
- (a) the x -intercept (b) the y -intercept
(c) the radius (d) the center of the circle

Quadratic Relations:

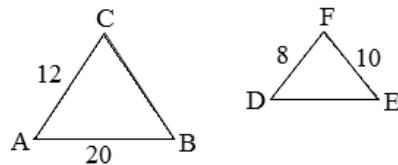
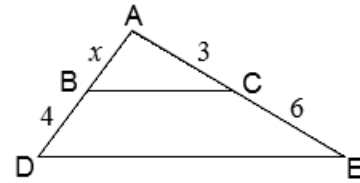
17. Determine the zeros (factor and solve):
- (a) $y = 2x^2 + 5x - 3$ (b) $y = 2x(x - 9)$
(c) $y = -3(2x - 5)(x + 10)$
18. Factor the following expressions completely:
- (a) $3b^2 + 24b + 45$ (b) $3x^2 + 7x + 2$
(c) $m^2 - 4m - 77$ (d) $2x^2 + 4x + 2$
19. Determine the factored form for the quadratic relations:
- (a) $y = 25x^2 - 4$ (b) $y = m^2 + 8m + 16$
(c) $y = h^2 - 14h + 45$ (d) $y = 2x^2 - 50$
20. Determine the coordinates of the vertex point:
- (a) $y = -2(x + 10)(x - 4)$ (b) $y = 3(x - 2)^2 + 1$
(c) $y = 0.75(x + 3)^2 - 4$ (d) $y = -(x + 3)^2$
21. Determine the roots for: $2(4x - 3)(x + 1) = 0$
22. Given the parabola $y = 2(x + 1)^2 - 6$, determine if the following points lie on the curve.
- (a) $(2, -12)$ (b) $(-3, 2)$

23. How would you verify that your solution to a system of equations is correct?
24. Given the quadratic equation $y = -7x^2 + 42 - 3$:
- Write the relation in vertex form by completing the square.
 - State the optimal value, and state whether it is a maximum or a minimum.
25. Determine the equation of the parabola, given:
- $a = -3$ and vertex is $(2, -1)$ in vertex format.
 - vertex $(-4, 3)$ and passes through $(-1, 48)$ in vertex form.
26. Given a parabola with zeros -1 and 5 and passes through $(1, -16)$:
- Determine the equation of the axis of symmetry.
 - Determine the equation in **factored form**.
 - Determine the coordinates of the vertex.
 - Write the equation in standard form.
27. A racket is fired into the air from edge of a cliff and falls to the ground. The height, h , in meters, of the ball relative to the ground after t seconds is modelled by $h = -5t^2 + 10t + 35$.
- Draw a diagram illustrating the flight.
 - How high is the edge of the cliff?
 - After how many seconds is the rocket at a height of 20 m above the ground?
 - Determine how long it takes for the rocket to reach a maximum height.
 - What is the maximum height?
28. Solve the equation $-3(x - 7)^2 + 14 = 2$. Correct your answer to two decimal places.
29. Determine the roots of the quadratic equation $2x^2 + 3x - 7 = 0$ by using the quadratic formula. Leave the answer in radical form.
30. What is the equation of the axis of symmetry of the relation $y = x^2 + 4x - 5$?
31. Given the quadratic relation $y = x^2 + 12x + 27$.
- Write the relation in factored form.
 - State the zeros.
 - Determine the equation of the axis of symmetry.
 - Determine the coordinates of the vertex.
32. Write the following relations in standard form:
- $y = 2x(5 - 2x) + 7$
 - $y = -3(x - 2)^2 + 8$
33. List the transformations that is needed for $y = x^2$ to transform to $y = -\frac{2}{3}(x + 6)^2 + 4$.

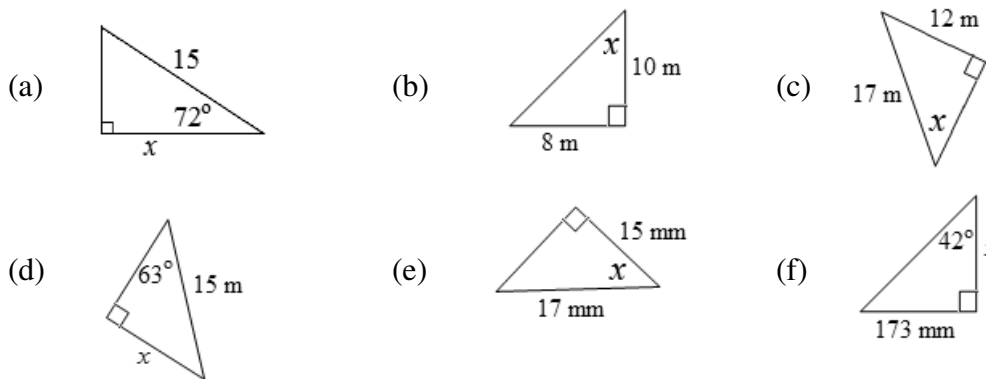
34. The parabola $y = x^2$ is translated 3 units to the right, compressed vertically by a factor of 2, reflected in the x -axis, and then, moved 11 units down. Write the equation of the image parabola.
35. The parabola $y = -5(x - 3)(x + 4)$ is moved 2 units to the right. State, in factored form, the equation of the image parabola. Leave in factored form.
36. State the coordinates of the vertex of the parabola $y = 7(x + 3)^2 - 1$ after it is reflected in the x -axis, moved 6 units down and translated 5 units to the right.
37. Write the equation of the image parabola given the parent equation, $y = -4(x - 2)^2 + 5$ is reflected in the x -axis, shifted 7 units to the left, stretched by a factor of 2, and translated 4 units upwards .

Trigonometry:

38. DE is parallel to BC . Find the length of x .
39. $\triangle ABC$ is similar to $\triangle DEF$. What is the scale factor?



40. Bobby places a 12 m ladder against a window sill on the second floor of a house at an angle of 63° with the ground. How high is the window sill above the ground? (one decimal place)
41. Find the length of the indicated side. Hint: Pythagorean Theorem $a^2 + b^2 = c^2$



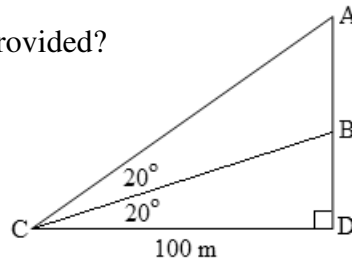
42. Find each ratio using a calculator (4 decimal places).

- (a) $\cos 15^\circ$ (b) $\sin 62^\circ$ (c) $\cos 42^\circ$
 (d) $\tan 315^\circ$ (e) $\cos 154^\circ$ (f) $\tan 158^\circ$

43. Find the measure of the angle (nearest degree).

- (a) $\cos A = 0.1547$ (b) $\tan A = 0.4226$ (c) $\sin A = 0.8386$
 (d) $\cos A = -0.7002$ (e) $\sin A = 0.7194$ (f) $\tan A = 0.8192$

44. Calculate the length of AB using the information provided?



45. Two supporting wires are fastened to the top of a TV satellite dish tower from two points on the ground, A and B on either side of the tower. One wire is 16.7 m long and the other is 12.2 m long. The angle of elevation of the longer wire is 45° .

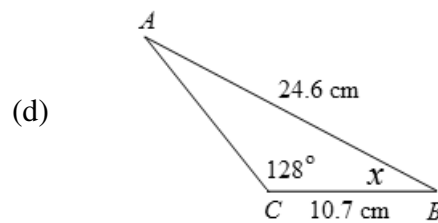
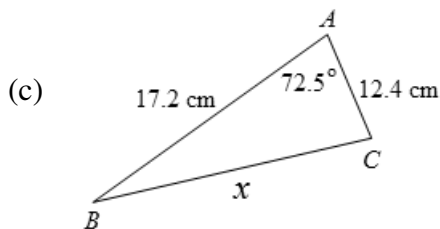
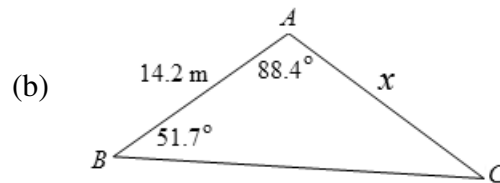
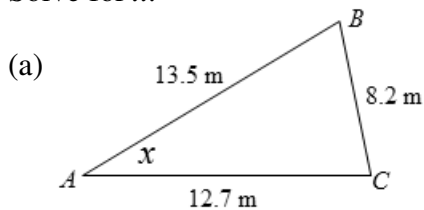
- (a) How far apart are A and B ?
 (b) How tall is the satellite dish tower?

46. If $\cos A = 0.3286$, find the nearest measure of $\angle A$.

47. Find the value of the ratio of $\sin 70^\circ$.

48. In $\triangle ABC$, $\angle A$ is 90° , $\angle B$ is 50° and c is 16 cm. Find the length of side a (nearest centimeter).

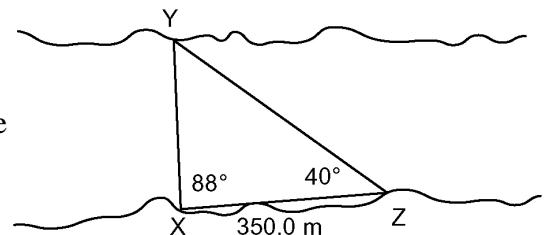
49. Solve for x .



Hint: find $\angle A$ first.

50. The foot (*bottom*) of a ladder is placed 1.5 m from a wall. The ladder makes a 70° angle with the level ground. Find the length of the ladder. (one decimal place.)

51. To measure the distance across a river, a surveyor took measurements and drew the diagram shown. Determine the distance from X to Y .



52. An airplane takes off from a runway near some mountains. The peak of one mountain is on the flight path of the airplane. The base of the mountain is 3 400 m from the end of the runway. If the mountain is 2 100 m high, determine what angle of ascent is needed to clear the mountain top. Round to the nearest degree. Note: ascent means: *an upward slope or incline*.