

## GRADE 10 LESSON 1

### Solving Linear Systems

1. Given the system of equations

$$3x + 2y = 4$$

$$-x - 3y = 1$$

select the solution that satisfies it:

a)  $x = 2, y = -1$     b)  $x = -1, y = 2$

2. Provide an example of a possible system of two linear equations that has the following solution:  $x = 2, y = -1$

3. Solve using the method of substitution:

a)  $2x + y = 8$

$$3x + 4y = 7$$

b)  $x + 2y = 11$

$$5x - 3y = 3$$

4. Solve using the method of elimination:

a)  $2x + y = 11$

$$3x - y = 9$$

b)  $x + 5y = 7$

$$3x - 2y = 4$$

5. Solve graphically:

a)  $x + y = 5$

$$x - y = 1$$

b)  $x + y = 4$

$$3x - y = 0$$

6. Prove that the following linear system has no solutions:

$$x - y = 6$$

$$x - y = 4$$

7. It took Tom 3 hours to get from point A to point B. Part of the trip he walked at a speed 4 km/h and the rest of the way he rode a bike at a speed of 20 km/h. The total distance AB is 28 km. How long did it take Tom to walk and how long was he biking for?

Answers: 1  $x = 2, y = -1$

2 answers may vary, check with a graphing calculator

3 a)  $x = 5, y = -2$  b)  $x = 3, y = 4$

4 a)  $x = 4, y = 3$  b)  $x = 2, y = 1$

5 a)  $x = 3, y = 2$  b)  $x = 1, y = 3$

6 graphically or algebraically

7 2 hours and 1 hour respectively

GRADE 10 LESSON 2  
Parabola. Quadratic Function

1. State the coordinates of any three points that satisfy the equation of the following quadratic function:  $y = -x^2 + 2x + 8$
2. Are the two points A(-1,5) and B(2,-9) lying on the graph of the function represented by the following equation:  $f(x) = x^2 - 4x - 5$
3. Convert the following quadratic function equations into the vertex form (complete the square), state the vertex and graph them :
  - a)  $y = x^2 + 3$    b)  $y = x^2 - 8x + 16$    c)  $f(x) = -x^2 + 6x - 8$
  - d)  $f(x) = 2x^2 + 4x + 6$
4. Graph the following function, state the critical points (vertex, x-intercepts, y-intercept, the equation of the axis of symmetry, optimal value):

$$y = -(x + 1)^2$$

Answers: 1 check with a graphing calculator

2 A - no, B - yes

3 a) Vertex (0,3), Axis of Sym:  $x = 0$ ,  $y(\min) = 3$ , no x-ints, y-int (0,3)

b) Vertex (4,0), Axis of Sym:  $x = 4$ ,  $y(\min) = 0$ , x-int (4,0), y-int (0,16)

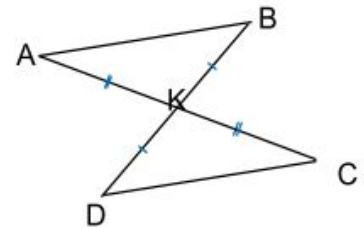
c) Vertex (3,1), Axis of Sym:  $x = 3$ ,  $y(\max) = 1$ , x-ints (2,0) and (4,0), y-int (0,-8)

d) Vertex (-1,4), Axis of Sym:  $x = -1$ ,  $y(\min) = 4$ , no x-ints, y-int (0,6)

4 Vertex (-1,0), Axis of Sym:  $x = -1$ ,  $y(\max) = 0$ , x-int (-1,0), y-int (0,-1)

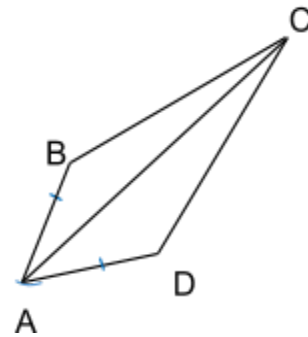
GRADE 10 LESSON 3  
Triangles and Their Properties

1. Given that  $DK = KB$ ,  $CK = AK$  and  $\angle B = 42^\circ$ , determine the measure of  $\angle D$ .



2. Given two right triangles,  $\triangle ABC$  ( $\angle C = 90^\circ$ ) and  $\triangle MNK$  ( $\angle K = 90^\circ$ ), prove that these triangles are congruent if  $AC = MK$  and  $\angle A = \angle M$ .

3. Given that  $AB = AD$ ,  $\angle BAC = \angle DAC$ , prove that  $CA$  is the angle bisector of  $\angle BCD$ .



4. The perimeter of an isosceles triangle is 28 cm. Its base is 10 cm. Determine the lengths of the other two sides.
5. Is a triangle, whose two angles are  $50^\circ$  and  $65^\circ$ , an isosceles triangle?
6. One side (non-base) of an isosceles triangle is 13 cm. The angle bisector to the base is 12 cm. What is the perimeter of this triangle?
7. What are the angle measures of a right isosceles triangle?
8. In a right triangle, one of the angle measures is  $60^\circ$  and the adjacent to this angle side is 15 cm. Determine the length of the longest slant side of the triangle (the hypotenuse).
9. Determine the length of a side of a square, if its diagonal is  $3\sqrt{2}$  cm.

Answers: 1  $42^\circ$

2 answers may vary

3 answers may vary

4 7 cm

5 yes

6 36 cm

7  $90^\circ$ ,  $45^\circ$ ,  $45^\circ$

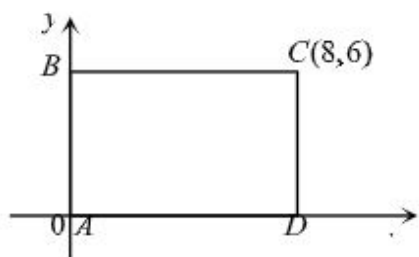
8 30 cm

9 15 cm

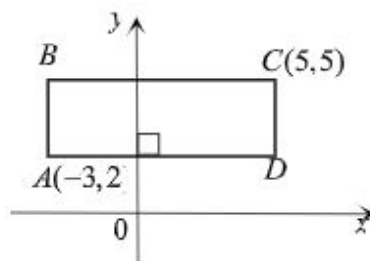
GRADE 10 LESSON 4  
Coordinate Geometry. Distance Between Two Points

1. Given a rectangle ABCD (two separate situations), determine the coordinates of the missing vertices in a) and then in b)

a)



b)



2. Determine the side lengths in the rectangles in question 1.
3. Determine the distance between  $C(-6,3)$  and  $D(0,-5)$ .
4. Given the vertices of a triangle:  $A(3,2)$ ,  $B(-1,1)$ ,  $C(11,-6)$ , determine all of the side lengths of this triangle.
5. Determine the x-coordinate of the point M, if it's y-coordinate is 7 and distance to point  $N(-1,5)$  is 10 units.
6. Point M is the Midpoint of the line segment AB. Determine the coordinates of the point M, if  $A(0,-5)$  and  $B(8,-1)$ .
7. Point  $M(0,-4)$  is the Midpoint of the line segment AB. Determine the coordinates of point A if  $B(-4,2)$ .
8. Given the equation of a circle, determine the coordinates of its centre and the radius:

a)  $(x + 4)^2 + (y - 5)^2 = 49$       b)  $(x + 1)^2 + y^2 = 3$

9. Determine the equation of a circle, given the coordinates of its centre and its radius:
- a)  $C(0,-6)$ ,  $r = \sqrt{3}$       b)  $C(-1,3)$ ,  $r = 3$
10. State the equation of a circle with the centre  $C(1,-5)$ , that touches the x-axis.
11. State the equation of a circle with the diameter AB, where  $A(0,0)$  and  $B(6,-8)$ .
12. Given that the equation of a circle is  $x^2 + (y - 9)^2 = 169$ , confirm whether points  $A(5,-3)$  and  $B(0,-4)$  are the points on the circle.

Answers: 1 a)  $A(0,0)$ ,  $B(0,6)$ ,  $D(8,0)$  b)  $B(-3,5)$ ,  $D(5,2)$

2 a) 8, 6 b) 8, 3

3 10

4 5, 13,  $8\sqrt{2}$

5  $y=-1$  and  $y=11$  (two possible solutions)

6  $M(4,-3)$

7  $A(4, -10)$

8 a)  $C(-4,5)$ ,  $r=7$  b)  $C(-1,0)$ ,  $r=\sqrt{3}$

9 a)  $x^2 + (y + 6)^2 = 3$  b)  $(x + 1)^2 + (y - 3)^2 = 9$

10  $(x - 1)^2 + (y + 5)^2 = 25$

11  $(x - 3)^2 + (y + 4)^2 = 25$

12 A and B are on the circle

GRADE 10 LESSON 5  
Right Triangle Trigonometry

1. In the right triangle ABC ( $\angle C = 90^\circ$ ) the hypotenuse = 17 cm and one of the sides AC = 15 cm.

Determine the values of  $\sin(A)$ ,  $\cos(A)$ ,  $\tan(A)$ ,  $\sin(B)$ ,  $\cos(B)$ ,  $\tan(B)$ .

2. The legs of the right triangle are 2 cm and 3 cm. Determine:

- a) the tangent ratio for the angle, adjacent to the longer leg
- b) the sine ratio for the angle, opposite the shorter leg
- c) the cosine ratio for the angle adjacent to the longer leg

3. Determine the measure of the angle A, if:

a)  $\tan(A) = \frac{3}{4}$       b)  $\tan(A) = 2$

4. Determine the values of sin, cos and tan ratios of one of the acute angles in the isosceles triangle.

5. In the right triangle ABC,  $\sin(A) = 0.8$  and the hypotenuse is  $c = 6\text{m}$ . Determine the value of  $\cos(A)$  and the lengths of the two legs, a and b.

6. In the right triangle ABC,  $\angle A = 30^\circ$  and side  $a = 3$  cm. Determine the lengths of the other leg and the hypotenuse, as well as measure of  $\angle B$ .

7. Evaluate:

a)  $6\sin 30^\circ - 3\cos 60^\circ + \tan 45^\circ$

b)  $\cos 30^\circ \times \sin 60^\circ$

c)  $1 - 2\cos^2 45^\circ$

8. Simplify:

a)  $1 + \cos^2 \alpha - \sin^2 \alpha$

b)  $\tan \alpha (1 - \sin^2 \alpha)$



Answers: 1  $\sin(A) = \frac{8}{17}$ ,  $\cos(A) = \frac{15}{17}$ ,  $\tan(A) = \frac{8}{15}$ ;  $\sin(B) = \frac{15}{17}$ ,  $\cos(B) = \frac{8}{17}$ ,  $\tan(B) = \frac{15}{8}$

2 a)  $\frac{2}{3}$  b)  $\frac{2}{\sqrt{13}}$  c)  $\frac{2}{\sqrt{13}}$

3 check with a calculator

4  $\sin 45^\circ$

5  $\cos(A) = 0.6$ ,  $a = 4.8m$ ,  $b = 3.6m$

6  $\angle B = 60^\circ$ ,  $a = 3\sqrt{3}$ ,  $b = 6$

7 a) 2 b)  $\frac{3}{4}$  c) 0

8 a)  $2\cos^2 a$  b)  $\sin a \cos a$

## GRADE 10 LESSON 6

### Solving Quadratic Equations. Discriminant

1. Solve the following quadratic equations:

a)  $7x^2 + 5 = 5$     b)  $2x^2 - 10 = 0$     c)  $x^2 = \frac{4}{25}$     d)  $x^2 + 0.16 = 0$

2. Solve the following quadratic equations by factoring:

a)  $x^2 + 17x = 0$     b)  $\frac{1}{9}x^2 - x = 0$     c)  $x^2 - 2x = x$

3. Solve the following quadratic equations:

a)  $3x^2 - 2x - 5 = 0$

b)  $9x^2 - 14x + 5 = 0$

c)  $9x^2 - 4x - 2 = 0$

d)  $x^2 - 6x + 10 = 0$

4. Solve the following quadratic equations:

a)  $x^2 - 7x + 10 = 0$

b)  $x^2 - 3x - 10 = 0$

c)  $x^2 - 10x - 48 = 0$

d)  $x^2 + 12x + 27 = 0$

5. What are the side lengths of a rectangle with the perimeter,  $P = 30 \text{ cm}$  and area,  $A = 50 \text{ cm}^2$ .

Answers: 1 a)  $x_1 = -4$ ,  $x_2 = 4$  b)  $x_1 = -7$ ,  $x_2 = 7$  c)  $x_1 = -2\sqrt{3}$ ,  $x_2 = 2\sqrt{3}$  d) no roots

2 a)  $x_1 = 0$ ,  $x_2 = 4$  b)  $x_1 = 0$ ,  $x_2 = -\frac{2}{7}$  c)  $x_1 = 0$ ,  $x_2 = -\frac{4}{3}$

3 a)  $x_1 = -4$ ,  $x_2 = -3$  b)  $x_1 = -\frac{1}{3}$ ,  $x_2 = -\frac{1}{4}$  c)  $x = 2.5$  d) no roots

4 a)  $x_1 = 2$ ,  $x_2 = 3$  b)  $x_1 = -4$ ,  $x_2 = 7$  c)  $x_1 = -5$ ,  $x_2 = 6$  d)  $x_1 = -6$ ,  $x_2 = -5$

5 5cm and 10cm

GRADE 10 LESSON 7  
Expressions with Exponents

1. Evaluate:

a)  $\sqrt[4]{16}$       b)  $\sqrt[8]{0}$       c)  $\sqrt[3]{-27}$       d)  $\sqrt[4]{625} - \sqrt[3]{-1125}$

2. Can the expression be evaluated? (Yes or No)

a)  $\sqrt[3]{-20}$       b)  $\sqrt[4]{-6}$       c)  $\sqrt[8]{(-2)^5}$       d)  $\sqrt[10]{(-5)^2}$

3. Evaluate:

a)  $25^{0.3} \times 5^{0.4}$   
b)  $64^{-\frac{1}{6}} 4^{\frac{2}{3}} 2^{\frac{8}{3}}$   
c)  $(81 \times 16)^{0.25}$

4. Simplify:

a)  $(27x^3)^{-\frac{1}{3}}$   
b)  $\left(\frac{1}{a^4}\right)^{-\frac{1}{2}}$   
c)  $\frac{a^{5.2} a^{-0.3}}{a \times a^{0.9}}$   
d)  $(x^{0.5} - y^{0.5})x^{0.5}y + (xy^3)^{0.5}$

5. Evaluate:

a)  $\frac{12^{-5} \cdot 16^4}{2^4 \cdot 3^{-6}}$       b)  $\frac{5 \cdot 2^{32} - 4 \cdot 2^{30}}{4^{16}}$

6. Simplify:

a)  $9^{x+2} \cdot (3^{1-x})^3$

b)  $\frac{9 \cdot 3^{2n}}{(3^{n-1})^2}$

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

Answers: 1 a) 2 b) 0 c) -3 d) 10

2 a) yes b) no c) no d) yes

3 a) 5 b) 8 c) 6

4 a)  $\frac{1}{3x}$  b)  $a^2$  c)  $a^3$  d)  $xy$

5 a) 12 b) 4

6 a)  $3^{7-x}$  b) 81 c)  $\frac{2^x}{6}$