

1. Find the equation of the line passing through the points  $(-3, 13)$  and  $(2, -2)$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-2 - 13}{2 + 3}$$

$$= \frac{-15}{5} = -3$$

$$y = m(x - x_1) + y_1$$

$$= -3(x - 2) - 2$$

$$= -3x + 6 - 2$$

$$= -3x + 4$$

2. Find the point of intersection of the lines  $y - x - 4 = 0$  and  $y = 2x - 1$  using substitution and elimination.

sub ② in ①

$$2x - 1 - x - 4 = 0$$

$$x - 5 = 0$$

$$x = 5$$

sub  $x = 5$  in ②

$$y = 2(5) - 1$$

$$= 9$$

$\therefore (5, 9)$  is the POI.

3. Expand and simplify the expression

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

$$= -3[x^2 - 2x + 3x - 6]$$

$$= -3[x^2 + x - 6]$$

$$= -3x^2 - 3x + 18$$

b)  $(2x-3)^2$      $(a-b)^2 = a^2 - 2ab + b^2$

$$= 4x^2 - 12x + 9$$

4. Factor the expressions

a)  $3t^2 + 6t + 3$

$$= 3(t^2 + 2t + 1)$$

$$= 3(t+1)(t+1) = 3(t+1)^2$$

b)  $6x^2 + 4x - 10$

$$= 2(3x^2 + 2x - 5)$$

$$= 2(3x^2 + 5x - 3x - 5)$$

$$= 2(x(3x+5) - 1(3x+5))$$

$$= 2(x-1)(3x+5)$$

c)  $4x^2 - 49$

$$= (2x-7)(2x+7)$$

d)  $\frac{1}{2}x^2 + 3x$

$$= \frac{1}{2}x(x+6)$$

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

vertex:  $(-3, 4)$

axis of symmetry:  $x = -3$

opening: down

step pattern:  $-2(1, 3, 5, 7) = -2, -6, -10, -14$

(max)/min value of 4

Transformations:

- vertically stretched by a factor of 2
- reflection on x-axis
- horizontal translation 3 units left
- vertical translation 4 units up.

5. Complete the square and state the vertex:  $y = 2x^2 - 8x + 3$

$$\begin{aligned}y &= 2(x^2 - 4x) + 3 \\ &= 2(x^2 - 4x + 4 - 4) + 3 \\ &= 2(x - 4x + 4) + 3 - 8 \\ &= 2(x - 2)^2 - 5 \\ &V(2, -5)\end{aligned}$$

6. Solve for x.

a)  $5(x + 2) = 3(x - 1)$

$$5x + 10 = 3x - 3$$

$$5x - 3x = -3 - 10$$

$$2x = -13$$

b)  $x^2 = 4x$        $x = -\frac{13}{2}$

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

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

$$x = 0 \quad \text{or} \quad x = 4$$

c)  $2x^2 - 5x + 2 = 0$

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

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

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

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

d)  $\frac{x}{5} = \frac{3}{2} + \frac{x}{4}$

$$20\left(\frac{x}{5}\right) = 20\left(\frac{3}{2}\right) + 20\left(\frac{x}{4}\right)$$

$$4x = 30 + 5x$$

$$4x - 5x = 30$$

$$-x = 30$$

$$x = -30$$

Complete the "Review of Essential Skills" handout (double sided).

## Review of Essential Skills – Getting Started for Unit 1

### 1. Operations with Integers

Ex. Evaluate

a)  $3 + (-6)(-4)$

$$= 3 + 24$$

$$= 27$$

b)  $(-5)^2$

$$= (-5)(-5)$$

$$= 25$$

c)  $-3^4$

$$= -3 \times 3 \times 3 \times 3$$

$$= -81$$

### 2. Operations with Rational Numbers

Ex. Evaluate  $\frac{6}{5} \times \frac{2}{5} \div \frac{-4}{15} = \frac{6}{5} \times \frac{2}{5} \times \frac{15}{-4}$

$$= \frac{180}{-100} = \frac{18}{-10} = \frac{-9}{5}$$

### 3. Evaluating Algebraic Expressions

Ex. Find the value of  $5x^2y + 6xy - 4y^2 - 1$  if  $x = -3$  and  $y = 2$

$$= 5(-3)^2(2) + 6(-3)(2) - 4(2)^2 - 1$$

$$= 90 - 36 - 16 - 1$$

$$= 37$$

### 4. Expanding and Simplifying Algebraic Expressions

Ex. Expand and simplify

a)  $5x^2y(2xy - 3y^2)$

$$= 10x^3y^2 - 15x^2y^3$$

b)  $(3x + 2y)^2$

$$= 9x^2 + 12xy + 4y^2$$

c)  $\frac{(x^2y^3)^0(6x^3y^4)^2}{(3xy^3)^3} = \frac{36x^6y^8}{27x^3y^9}$

$$= \frac{4}{3}x^3y^{-1} = \frac{4x^3}{3y}$$

### 5. Factoring

Ex. Factor fully

a)  $x^2 - 25y^2$

$$= (x - 5y)(x + 5y)$$

b)  $x^2 - 5x - 6$

$$= (x - 6)(x + 1)$$

c)  $6x^2 + 14x + 4$

$$= 2(3x^2 + 7x + 2)$$

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

### 6. Solving Equations

Ex. Solve

a)  $2x + 5 = 9$

$$2x = 9 - 5$$

$$2x = 4$$

$$x = 2$$

b)  $x^2 - 4x + 3 = 0$

$$(x - 3)(x - 1) = 0$$

$$x = 3 \quad x = 1$$

c)  $3x^2 - 8x = 4 \rightarrow 3x^2 - 8x - 4 = 0$

use QF  $a = 3$   $b = -8$   $c = -4$

$$x = \frac{8 \pm \sqrt{112}}{6} = \frac{4 \pm 2\sqrt{7}}{3}$$

Solutions

1. a) 27   b) 25   c) -81   2.  $-\frac{9}{5}$    3. 37

4. a)  $10x^3y^2 - 15x^2y^3$    b)  $9x^2 + 12xy + 4y^2$    c)  $\frac{4x^3}{3y}$

5. a)  $(x + 5y)(x - 5y)$    b)  $(x + 1)(x - 6)$    c)  $2(3x + 1)(x + 2)$

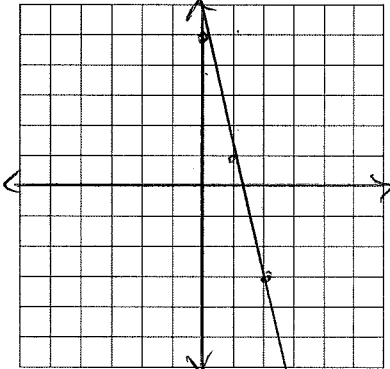
6. a) 2   b) 1, 3   c)  $\frac{8 \pm \sqrt{112}}{6} = \frac{4 \pm 2\sqrt{7}}{3}$

### Essential Grade 10 Skills Needed for Later Units

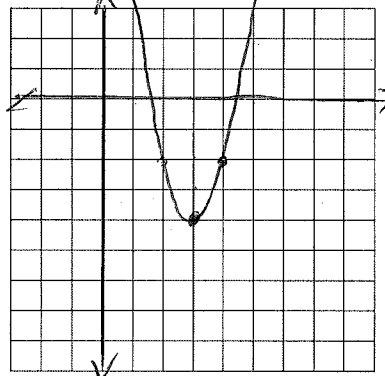
#### 7. Graphing

Ex. Name the type of relation, name the original (untransformed) function, list the transformations, then graph.

a)  $y = -4x + 5$  Linear



b)  $y = 2(x-3)^2 - 4$



$V(3, -4)$

Step pattern: 2, 6, 10, 14  
original function:  $y = x^2$

Name of relation: quadratic

Transformations: vertically stretched by a factor of 2

horizontal translation 3 units to the right and vertical translation 4 units down.

#### 8. Solving Linear Systems

Ex. Solve

$y = 3x - 2$  (1)

$y = 6x + 7$  (2)

$3x - 2 = 6x + 7$

$3x - 6x = 7 + 2$

$-3x = 9$

$x = -3$

Sub  $x = -3$  in (1)

$y = 3(-3) - 2$

$= -9 - 2$

$= -11$

$\therefore (-3, -11)$

#### 9. Quadratics – Completing the Square

Ex. Find the vertex of  $h = -2t^2 + 12t + 25$

$= -2(t^2 - 6t + 9 - 9) + 25$   
 $= -2(t^2 - 6t + 9) + 25 + 18$

$= -2(t - 3)^2 + 43$

#### 10. Trigonometry

Ex. Determine the value of  $\theta$  rounded to nearest degree and/or  $x$ , rounded to nearest tenth

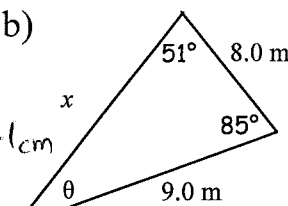
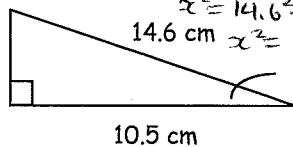
a)  $a^2 + b^2 = c^2$

$x^2 = 14.6^2 + 10.5^2$

$x^2 = 102.9$

$\cos \theta = \frac{10.5}{14.6}$

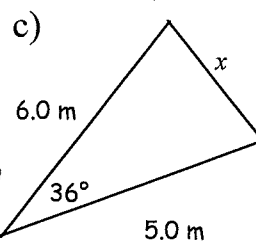
$\theta = 44^\circ$



$\frac{\sin \theta}{8} = \frac{\sin 51}{9} \quad \left| \quad \frac{x}{\sin 85} = \frac{9}{\sin 51} \right.$

$\theta = 44^\circ$

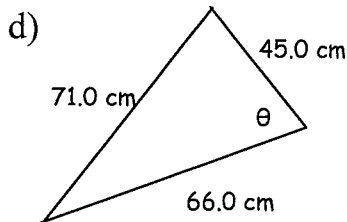
$x = 11.5 \text{ m}$



$x^2 = 6^2 + 5^2 - 2(6)(5)\cos 36$

$x^2 = 12.25$

$x = 3.5 \text{ m}$



$\cos \theta = \frac{45^2 + 66^2 - 71^2}{2(45)(66)}$

$\cos \theta = 0.225$

$\theta = \cos^{-1}(0.225)$

$= 77^\circ$

**Solutions**

- 7. a) linear,  $y = x$ , reflect about x axis, vertical stretch by a factor of 4, translate up 5 units
- b) quadratic,  $y = x^2$ , vertical stretch by a factor of 2, translate right 3 units and down 4 units

8.  $(-3, -11)$

9.  $(3, 43)$

10. a)  $\theta = 44^\circ, x = 10.1 \text{ m}$

b)  $\theta = 44^\circ, x = 11.5 \text{ m}$  c)  $x = 3.5 \text{ m}$  d)  $\theta = 77^\circ$