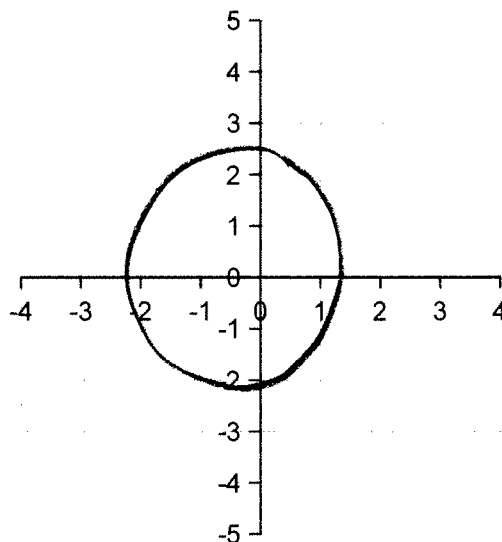
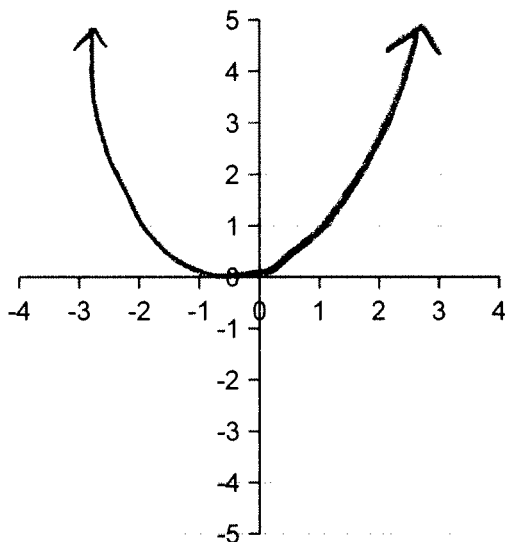


Review for MCR3U Quadratic Functions Test

1. Given the function $f(x) = 4x^2 - 3x - 5$, find $f(-4)$. $\neq f(-4) = 4(-4)^2 - 3(-4) - 5 = -57$

2. Draw one curve that represents a **function** and one that represents a **non-function**.



3. Find the equation for this parabola, which also passes through $(-2, -32)$. DO NOT estimate where the vertex is ... you don't need it!

$$y = a(x)(x+10)$$

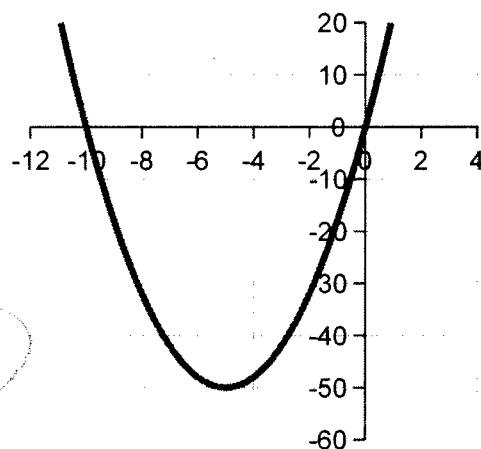
$$-32 = a(-2)(-2+10)$$

$$-32 = a(-2)(8)$$

$$\frac{-32}{-16} = \frac{a(-16)}{-16}$$

$$a = 2$$

$$\therefore y = 2(x)(x+10)$$



4. Find the vertex of $y = 2x^2 - 16x + 7$. State whether the vertex is a minimum or a maximum.

$$x = \frac{-b}{2a} = \frac{16}{2(2)} = 4$$

$$y = 2(4)^2 - 16(4) + 7 = -25$$

\therefore Vertex is at $(4, -25)$

Parabola opens up

\therefore it is a minimum

5. Determine where (if at all) the parabola $y = 4x^2 - 2x + 2$ and the line $y = 2x + 26$ intersect.

$$4x^2 - 2x + 2 = 2x + 26$$

$$y = 2(3) + 26 = 32$$

$$4x^2 - 2x - 2x + 2 - 26 = 0$$

$$y = 2(-2) + 26 = 22$$

$$4x^2 - 4x - 24 = 0$$

$$4(x^2 - x - 6) = 0$$

∴ They intersect at

$$4(x-3)(x+2) = 0$$

$(3, 32)$ and $(-2, 22)$

$$\therefore x = 3, -2$$

6. Give the equation of the parabola that begins with $y = x^2$ but is stretched 4 times vertically (taller), ~~stretched 3 times horizontally (wider)~~, translated 13 units to the right and translated 2 units down.

Your equation:

$$y = 4(x-13)^2 - 2$$

7. The equation for an object's height h at time t seconds after launch is $h(t) = -4.9t^2 + 19.6t + 58.8$, where h is in meters.

- a) When does the object strike the ground?

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-19.6 \pm \sqrt{19.6^2 - 4(-4.9)(58.8)}}{2(-4.9)} = \frac{-19.6 \pm 39.2}{-9.8}$$

$$= 6 \text{ or } -2$$

∴ After 6 seconds

- b) What is the maximum height of the projectile?

Max height at vertex $\Rightarrow t = 2$ (midpoint of x-intercepts)

$$h(2) = -4.9(2)^2 + 19.6(2) + 58.8$$

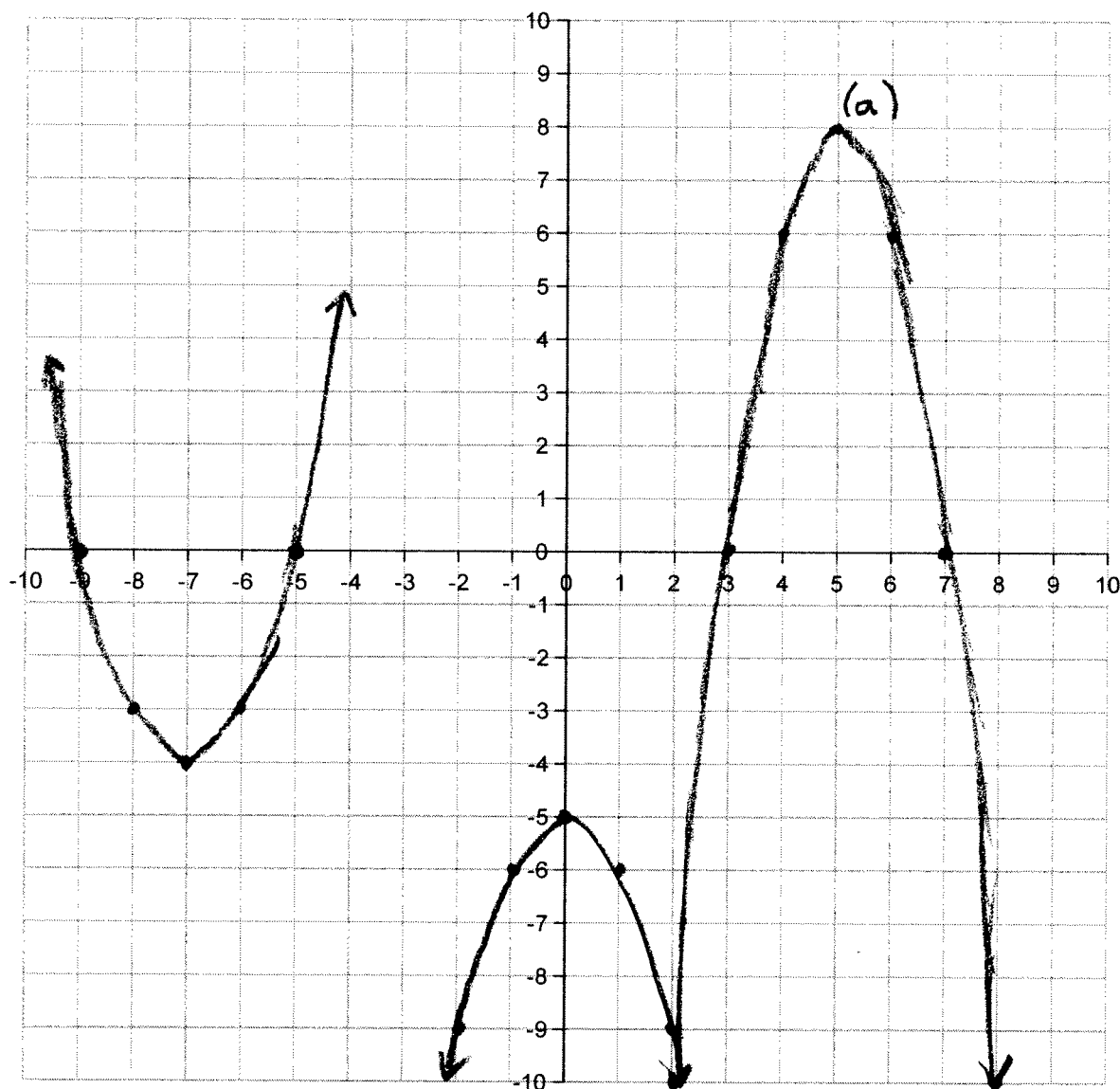
$$= 78.4 \text{ m}$$

10. Graph each of the following functions.

a) $y = -2(x-5)^2 + 8$

b) $y = (x+9)(x+5)$

c) $y = -5 - x^2$



11. A producer of synfuel from coal estimates that the cost, c in dollars per barrel for a production run of x thousand barrels is given by $c(x) = 9x^2 - 180x + 940$.

a) How many thousand barrels should be produced each run to keep the cost per barrel at a minimum?

$$x = \frac{-b}{2a} = \frac{180}{2(9)} = 10$$

∴ Ten thousand

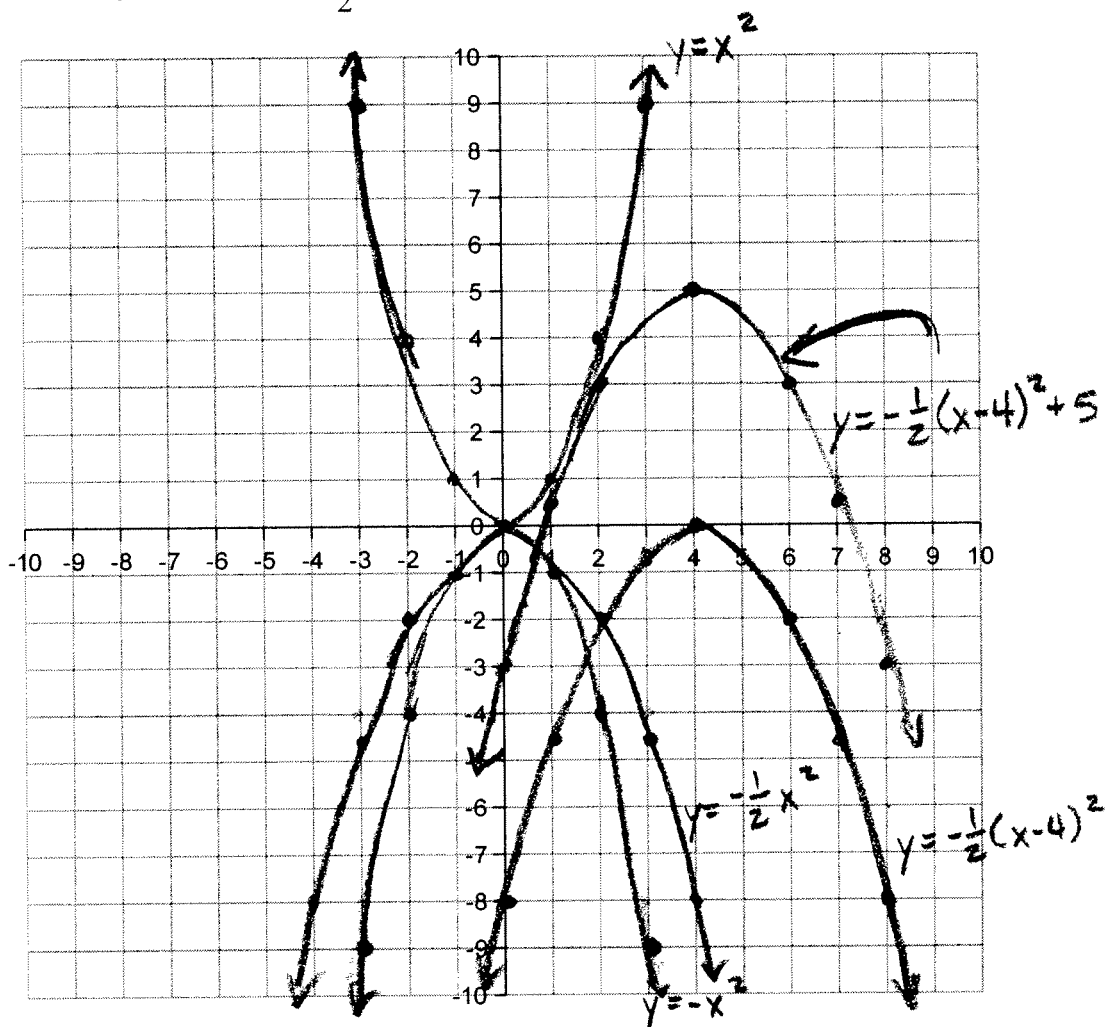
b) What is the minimum cost per barrel of synfuel?

$$c(10) = 9(10)^2 - 180(10) + 940 = 40$$

8. a) Identify the transformations that $y = -\frac{1}{2}[(x-4)]^2 + 5$ experiences relative to the original function, $y = x^2$.

flipped vertically
compressed vertically $\times \frac{1}{2}$
translated 4 right
translated 5 up

- b) On the grid, draw the curve $y = x^2$. Then, apply each of the proper transformations, one by one, to arrive at the graph for $y = -\frac{1}{2}[(x-4)]^2 + 5$ (same as shown above).



9. How is the graph of $y = \frac{1}{2}x^2$ different from the graph of $y = \left(\frac{1}{2}x\right)^2$?

compressed
vertically
 $\times \frac{1}{2}$

$$= \frac{1}{4}x^2$$

compressed
vertically
 $\times \frac{1}{4}$