MC # 6, 7, 8 FS. # 7, 9, 13, 10, 12, 11, 5

Practice Test 4: Quadratic Relations

K: ____	A: ____	T: ____	C: ____

PART A: Multiple Choice Questions
Instructions: Circle the English letter of the best answer.
Circle one and ONLY one answer for each question.

Knowledge/Thinking:

6. Which relation in standard form represents the same parabola as $y = 5(x-6)^2 - 20$?

(a) $y = 5x^2 - 6x - 20$ (b) $y = 5x^2 - 12x + 16$ (c) $y = 5x^2 - 60x + 160$ (d) $y = 5x^2 - 12x + 160$

$y = 5(x-6)^2 - 20$
$= 5(x^2 - 6x - 6x + 36) - 20$
$= 5(x^2 - 12x + 36) - 20$
$= 5x^2 - 60x + 180 - 20$
$= 5x^2 - 60x + 160$

GCF = 4

7. Which are the zeros for the quadratic relation $y = 4x^2 - 100$? → $y = 4(x^2 - 25)$

(a) $x = 0$ (b) $x = 2$ and 10 (c) $x = 5$ and 10 (d) $x = -5$ and 5 (e) $x = 4$ and 5

$x^2 - 25$
$x \mid 5$
$x \mid -5$

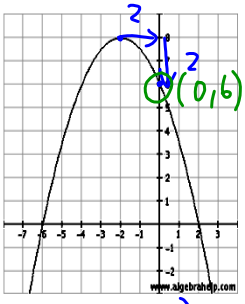
8. Which is the equation for the parabola shown on the right?

(a) $y = -0.5(x-2)^2 + 8$
(b) $y = -0.5(x+8)^2 - 2$
(c) $y = -0.5(x+2)^2 + 8$ $h = -2$ $k = 8$
(d) $y = 2(x-2)^2 + 8$
(e) $y = -2(x+2)^2 + 8$

x	x^2	?
1	1	
2	4	2

÷ 2

$a = -\frac{1}{2}$



$y = a(x-h)^2 + k$ $x = 0, y = 6$ $h = -2, k = 8$

$V = (-2, 8)$
$h \quad k$

$6 = a(0-(-2))^2 + 8$
$6 = a(2)^2 + 8$
$6 = 4a + 8$
$-8 \quad -8$
$-2 = 4a$
$\frac{-2}{4} = \frac{4a}{4}$
$-\frac{1}{2} = a = -0.5$

5. Find the x-intercept and y-intercept of each relation.

(a) $y = 4(x-8)^2 - 16$ [K: 6]

(b) $y = 3x^2 - 33x - 36$ [K: 3]

y=0 x=0 GCF = 3

y-intercept when x=0,

$y = 4(0-8)^2 - 16$

$= 240$

y-intercept is 240.

$0 = 4(x-8)^2 - 16$

$\frac{16}{4} = \frac{4(x-8)^2}{4}$

$4 = (x-8)^2$

$\pm\sqrt{4} = x-8$

$2 = x-8$ or $-2 = x-8$

$+8 \quad +8 \qquad +8 \quad +8$

$10 = x$ or $6 = x$

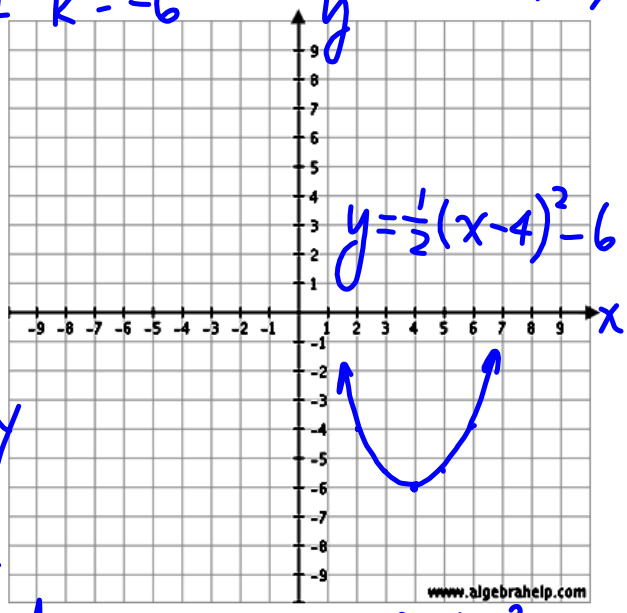
x-intercepts are 6 and 10.

7. For each quadratic relation,
(a) describe the transformation of the parabola as compared to the graph of $y = x^2$.
(b) sketch the graph of the parabola.

(i) $y = \frac{1}{2}(x-4)^2 - 6$ [C: 8]

$a = \frac{1}{2}$ $h = 4$ $k = -6$ $V = (4, -6)$

(a) ~~The~~ $y = x^2$ is vertically compressed by a factor of $\frac{1}{2}$, a ✓ h ✓ shifted horizontally by 4 units to the right, and k ✓ shifted vertically down by 6 units.



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

9. A football player kicks a ball into the air. The ball's path can be modelled by the relation $h = -0.04(d-19)^2 + 14.44$, where h is the ball's height, and d is the ball's distance from the kicker, both in metres.

a = −0.04 k = 14.44 h = 19 max (19, 14.44)

(a) What is the maximum height reached by the ball? What is the ball's horizontal distance at this point? [A: 2]

* Vertex

Max. height = 14.44 m

Horizontal Distance = 19 m

(b) What horizontal distance will the ball travel before it lands? [A: 4]

$d = ?$ $h = 0$

$h = -0.04(d-19)^2 + 14.44$

$0 = -0.04(d-19)^2 + 14.44$

$-14.44 \quad -14.44$

$\frac{-14.44}{-0.04} = \frac{-0.04(d-19)^2}{-0.04}$

$\frac{14.44}{0.04} = (d-19)^2$

$\pm\sqrt{\frac{14.44}{0.04}} = d-19$

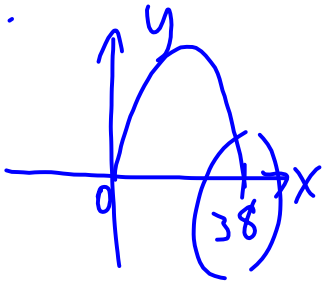
$19 = d-19$ or $-19 = d-19$

$+19 \quad +19$ $+19 \quad +19$

$38 = d$ or $0 = d$

initial.

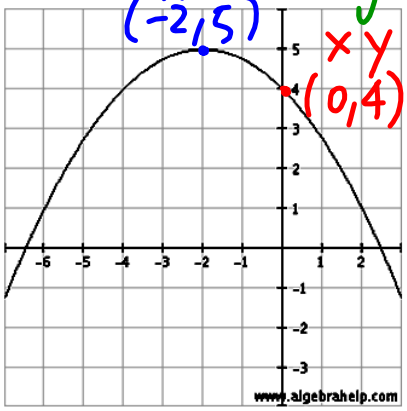
∴ The horizontal distance is 38 m when the ball lands.



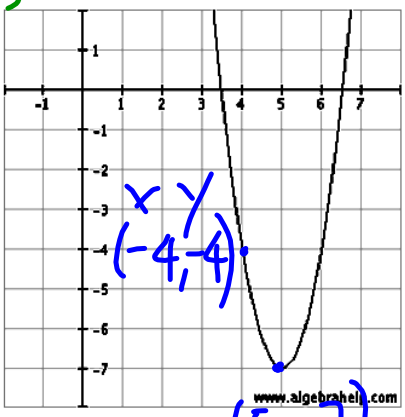
10. For each of the following parabolas, state the equation for the quadratic relation in the form $y = a(x-h)^2 + k$. [A: 8]

$y = -\frac{1}{4}(x+2)^2 + 5$

(a)



(b)



Use vertex + one point and sub into $y = a(x-h)^2 + k$ to find a.

$y = 3(x-5)^2 - 7$

11. A parabola, whose vertex is (3, –5), opens upward and passes through point (13, 20). Determine its equation in the form $y = a(x-h)^2 + k$. [T: 4]

Sub $x=13$, $y=20$, $h=3$, $k=-5$ into $y=a(x-h)^2+k$ for a.

12. A soccer ball is kicked from the ground level. When it has travelled 35 m horizontally, it reaches its maximum height of 25 m. The soccer ball lands on the ground 70 m from where it was kicked. Model this situation with a relation in the form $y = a(x-h)^2 + k$. [T: 4]

h

k

x "0" height

vertex = (h, k)

(35, 25)

point = (x, y)

(70, 0)

sub into

$y = a(x-h)^2 + k$ for a

13. Examine the given table of values and determine the equation of the relation in the form $y = a(x-h)^2 + k$. [T: 4]

x	y
–1	–32
0	–18
1	–8
2	–2
3	0
4	–2

vertex

$a = ?$ $h = ?$ $k = ?$

(x, y) & vertex

$(2, -2)$ $(3, 0)$

x y h k

$y = a(x-h)^2 + k$

$-2 = a(2-3)^2 + 0$

$-2 = a(-1)^2$

$-2 = a$

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