MCF3MI Huron Heights Secondary

# EXAM REVIEW 4

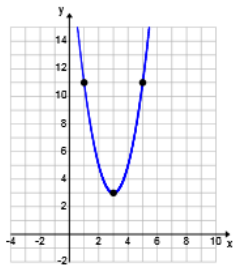
*CHAPTER 4: Quadratic Models: Standard & Factored Forms*

1. Write the function $f(x)=2(x+3)^2-2$ in standard form.

2. For the function $f(x)=-(x-4)^2+1$, complete the table:

| | |
|---|---|
| Vertex | |
| Axis of Symmetry | |
| Max/Min Value | |
| Domain | |
| Range | |

3.

| | |
|---|---|
| Determine the equation of the parabola . |  |

4. Write each function in vertex form and state the vertex.

   (a) $f(x)=-x^2+6x+7$ (b) $g(x)=2x^2-3x+3.5$

5. The cost, $C(n)$, of operating a cement-mixing truck is modeled by the function $C(n)=2.2n^2-66n+700$, where $n$ is the number of minutes the truck is running. What is the minimum cost of operating the truck? Show your work.

6. Solve using the quadratic formula. State your answers correct to 2 decimal places.
   (a) $8x^2-6x+1=0$ (b) $x^2+3x=14$

7. A theatre company's profit can be modeled by the function $P(x)=-60x^2+700x-1000$ where $x$ is the price of a ticket in dollars. What is the break-even price of the tickets?

4. Write each function in vertex form and state the vertex.

(b) $g(x)=2x^2-3x+3.5$

Std. $f(x)=ax^2+bx+c$

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

factored $f(x)=a(x-r)(x-s)$

$=2(x^2-\frac{3}{2}x)+3.5$

$=2(x^2-\frac{3}{2}x+\quad-\quad)+3.5$

or $g(x)=2(x^2-1.5x)+3.5$

$=2(x^2-1.5x+(0.75)^2-(0.75)^2)+3.5$

$=2(x^2-1.5x+0.5625-0.5625)+3.5$

$=2(x-0.75)^2-1.125+3.5$

$=2(x-0.75)^2+2.375$

$\therefore V(0.75, 2.375)$

(a) $f(x)=-x^2+6x+7$

$=-(x^2-6x)+7$

$=-(x^2-6x+(3)^2-(3)^2)+7$

$=-(x^2-6x+9-9)+7$

$=-(x-3)^2+9+7$

$=-(x-3)^2+16$

$\therefore V(3,16)$

$x^2-6x+9$

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

$=(x-3)^2$

1 9

3 3

8. A model rocket is launched into the air. Its height, $h(t)$, in metres after $t$ seconds is $h(t) = -5t^2 + 40t + 2$.

(a) When is the rocket at a height of 62 m (correct to 2 decimal places)?
(b) What is the height of the rocket after 6 seconds?
(c) What is the maximum height of the rocket?

9. Without solving, determine the number of solutions of each equation. Show your work for full marks.

(a) $x^2 - 5x + 9 = 0$ (b) $3x^2 - 5x - 9 = 0$ (c) $16x^2 - 8x + 1 = 0$

10. For the function $f(x) = kx^2 + 8x + 5$, what value(s) of $k$ will have two distinct solutions.

11. The function $f(x) = x^2 + kx + k + 8$ touches the x-axis once. What value(s) could $k$ be?

$a=1 \quad b=k \quad c=k+8$ $\therefore$ one real root

$\therefore b^2 - 4ac = 0$

$(k)^2 - 4(1)(k+8) = 0$

$k^2 - 4k - 32 = 0$

$k^2 + 4k - 8k - 32 = 0$

$k(k+4) - 8(k+4) = 0$

$(k+4)(k-8) = 0$

1 -32
2 -16
3
4 -8
5
6
7
8

8. A model rocket is launched into the air. Its height, $h(t)$, in metres after $t$ seconds is $h(t) = -5t^2 + 40t + 2$.

(a) When is the rocket at a height of 62 m (correct to 2 decimal places)?
(b) What is the height of the rocket after 6 seconds?
(c) What is the maximum height of the rocket?

b) let $t=6$

$\therefore h(6) = -5(6)^2 + 40(6) + 2$

$= 62$ m

a) let $h(t) = 62$

$62 = -5t^2 + 40t + 2$

$5t^2 - 40t + 60 = 0$

$5(t^2 - 8t + 12) = 0$

$5(t-2)(t-6) = 0$

$\therefore t = 2$ or $t = 6$

1 12
2 6
3 4

c) find the vertex

$h(t) = -5t^2 + 40t + 2$

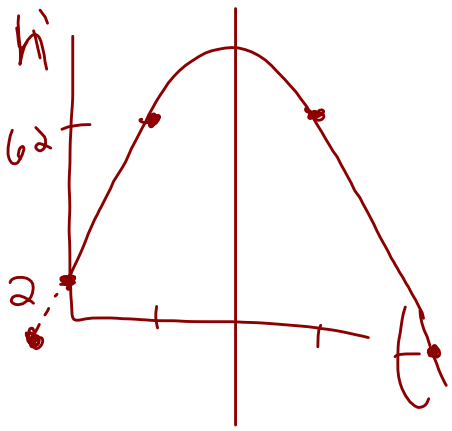
$= -5(t^2 - 8t) + 2$

$= -5(t^2 - 8t + 16 - 16) + 2$

$= -5(t-4)^2 + 80 + 2$

$= -5(t-4)^2 + 82$

$\therefore$ the rocket is at a height of 62 m when $t = 2$ sec or $t = 6$ sec.




AOS: $t = \frac{2+6}{2}$

$= \frac{8}{2}$

$t = 4$

$\therefore h(4)$

$= -5(4)^2 + 40(4) + 2$

$= 82$ m

$\therefore$ the max. height is 82 m