

Before we begin, are there any questions from last day's work?

Wed. Dec. 21 (extra help at lunch)	Exam Review (Compound Interest & Personal Finance): Day 1	Compound Interest Review Sheet #1, 2, 3, 6, 8, 12 <i>(Optional Extra Work: p.501 #13-18; p.510 #41-64; p.512 #69,73,75)</i>
Thurs. Dec. 22 (extra help at lunch)	Exam Review (Quadratic Relations I & II): Day 1	Quadratic Rel'ns Review Sheet #1, 4a, 6, 11, 16, 22 <i>(Extra p.350 #1-12)</i>

MBF 3CI: Unit 4 (Quadratic Relations Part 1) and Unit 5 (Quadratic Relations Part 2) Review Question Set

Always check FINAL ANSWERS after each question.

1. Do these ordered pairs belong to a curve of a quadratic relation? Explain!

No, the table is NOT QUADRATIC.
 ∴ the second differences are NOT constant

X	Y
18	0
20	3
22	4
24	4
26	0
28	-5
30	-12

FD SD
 3 → 1-3 = -2
 1 → 0-1 = -1
 0 → -4-0 = -4
 -4 → 5-(-4) = -1
 -5 → -7-(-5) = -2
 -7 → -12-(-5) = -7
 = -12+5 = -7

2. Is the relation $y = 2^x$ quadratic? Explain!

3. A cannonball is shot horizontally from the top of a cliff. Its path can be modeled by the quadratic relation $h = 150 - 4.9t^2$ where h is the cannonball's height above ground (metres) and t is the time (seconds). Complete the table of values:

Time	Height
0	
1	
2	
3	

4. State the vertex of each parabola.

a) $y = 3(x+4)^2 + 5$
 v(-4, 5)

b) $y = -2(x+1)^2 - 7$

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

d) $y = 0.5x^2$

5. A basketball was thrown upward. The basketball's path is given by the relation $h = -0.2(d - 2.5)^2 + 4.25$ where h is the basketball's height above ground and d is the basketball's horizontal distance from where it was thrown, both in metres.
- Sketch the relation.
 - What was the basketball's initial height above the ground (just as it was thrown)?
 - What was the basketball's greatest height above the ground?
What was the ball's horizontal distance at this point?

6. *Multiple Choice.* Which parabola is the most stretched?

A) $y = 3(x - 5)^2 + 4$

B) $y = 5(x + 4)^2 - 3$

C) $y = 0.1(x - 15)^2 + 3$

D) $y = 0.3(x + 0.8)^2 - 10$

7. *Multiple Choice.* Which parabola has its vertex 3 units above the x -axis?

A) $y = 3(x - 5)^2 + 4$

B) $y = 5(x + 4)^2 - 3$

C) $y = 0.1(x - 15)^2 + 3$

D) $y = 0.3(x + 0.8)^2 - 10$

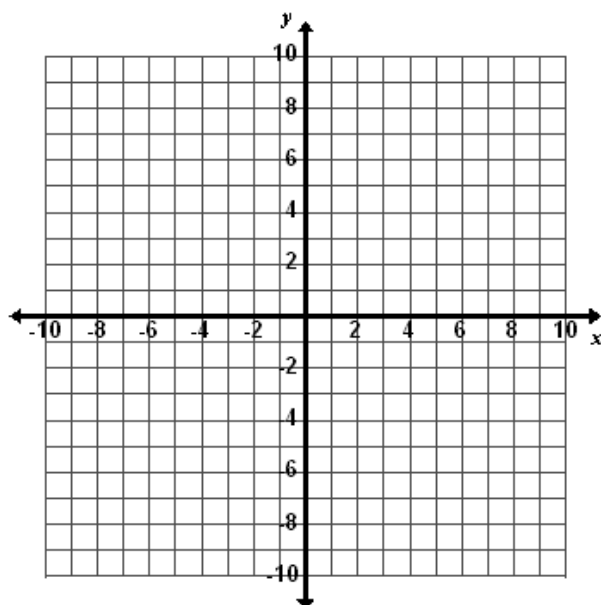
8. Find the y -intercept: $y = 2(x - 3)^2 + 4$

9. Find the y -intercept: $y = x^2 + 6x + 5$

10. Using the scale ratio: **1 block : 1 unit²**, graph:

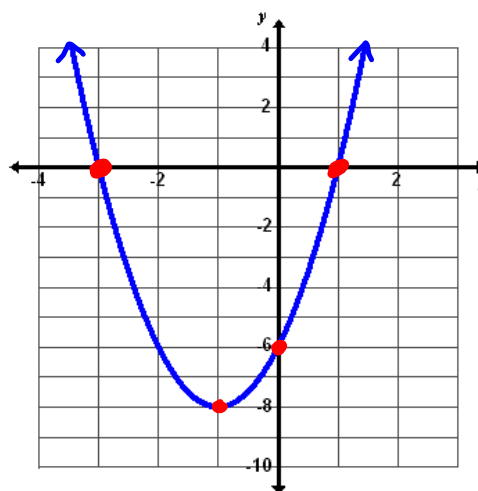
a) $y = 2(x + 5)^2 - 10$

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

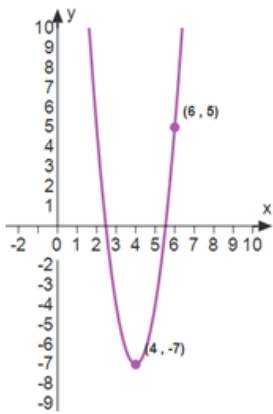


11. For the quadratic relation below, state the:

- a) x -intercept(s) (if any) $(-3, 0), (1, 0)$
b) y -intercept(s) (if any) $(0, -6)$
c) vertex $(-1, -8)$
d) ~~maximum, if there is one~~
e) minimum, if there is one -8



12. Write an equation for this parabola in the form $y = a(x - h)^2 + k$.



13. The *Windsor-Detroit International Freedom Festival* hosts one of the largest fireworks displays in the world. The fireworks are set over the Detroit River. The path of a certain firework rocket is modeled by $h = -4.9(t - 2)^2 + 169.6$ where h is the rocket's height above the water (metres), and t is the time (seconds). What is the maximum height reached?

14. A soccer ball is kicked from 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 quadratic relation in the form $y = a(x - h)^2 + k$ where y is the height of the ball after travelling x metres horizontally.
 - What is the soccer ball's height when it is 50 m from where it was kicked?

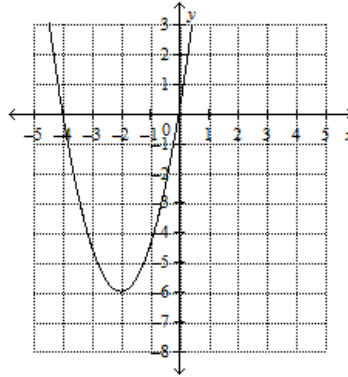
15. Select **TRUE** or **FALSE** for each statement below.
- a) The quadratic relation $y = 5(x - 4)^2 + 6$ is written in standard form.
 - b) A y -intercept is also called a "zero"
 - c) The largest number that can be divided out of $6x^2 + 15x + 18$ is 6.
 - d) The relation $y = 2(x - 3)(x + 4)$ is written in standard form.
 - e) The parabola $y = -0.6(x + 3)^2 + 7$ has a maximum value.

16. Expand and simplify: $(2x - 1)(4x - 1)$ FOIL

$$\begin{aligned} &= 8x^2 - 2x \cdot 4x + 1 \\ &= 8x^2 - 6x + 1 \end{aligned}$$

17. Determine the axis of symmetry for $y = (x - 2)(x - 6)$

18. What are the x -intercepts of the quadratic relation below?



19. Write the relation $y = 4(x-3)^2 + 8$ in standard form.

20. Factor completely.

a) $x^2 - 36x$

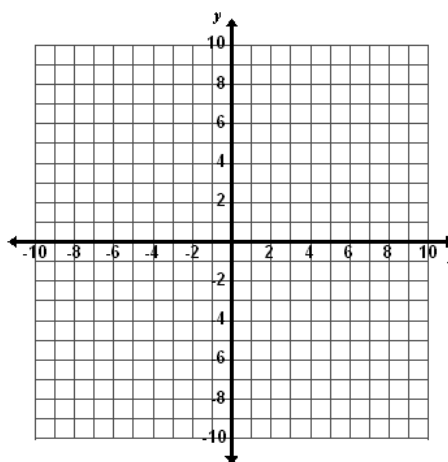
b) $x^2 - 16$

c) $x^2 - 6x - 27$

d) $2x^2 - 4x - 6$

21. For the parabola $y = x^2 - 4x - 5$:

- factor the right side, then state the zeroes
- use the zeroes to determine the vertex
- graph using the grid provided below



22. A golf ball is hit from ground level. Its path is modelled by the relation:

$$h = -4.9t(t - 6)$$

where h is the ball's height above the ground, in metres, and t is the time, in seconds.

- For how long will the ball travel before it hits the ground?
- How long will it take for the ball to reach the maximum height?

a) Let $h = 0$

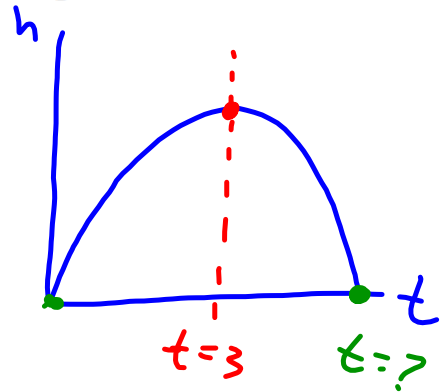
$$0 = -4.9t(t - 6)$$

$$\begin{array}{l} \downarrow \quad \text{or} \quad \downarrow \\ -4.9t = 0 \quad t - 6 = 0 \end{array}$$

$$t = 0 \quad t = 6$$

\therefore the ball will travel for 6 seconds before it hits the ground.

$$\begin{aligned} \text{b) A of S: } t &= \frac{0+6}{2} \\ &= 3 \text{ sec} \end{aligned}$$

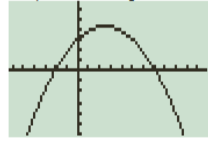


23. Find your Unit 4 (Quadratic Relations Part 1) test AND the Unit 5 (Quadratic Relations Part 2) test from your notebook. Go through each question, and ensure you understand how to get the correct answer.

FINAL ANSWERS

1. No. The first and second differences are not the same.
2. No. It is an exponential relation since it is of the form $y=ab^x$ where a and b are numbers and $b > 0$.
3. The respective height values are: 150 m, 145.1, 130.4, 105.9. (Do you know why this is a quadratic relation?)
4. a) (4, 5) b) (-1, -7) c) (1, 0) d) (0, 0)

5. a) basketball flight sketch:



- b) Let $d=0$ and solve for h . The initial height is 3 m
- c) At 2.5 m from where it was released, it reaches a maximum height of 4.25 m. This occurs at the parabola's vertex.

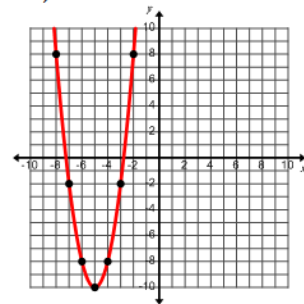
6. B (Remember a stretch is based on the number in front of the x^2 term. Since 5 makes the graph very narrow compared to the others, it is more vertically stretched).

7. C

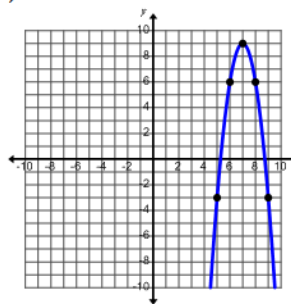
8. Let $x=0$ and solve for y . The y-intercept is $y=22$.

9. Let $x=0$ and solve for y . The y-intercept is $y=5$.

10. a)



b)



11. a) $x = -3$ and $x = 1$
- b) $y = -6$
- c) $(-1, -8)$
- d) no maximum
- e) minimum $y = -8$

12. $y = 3(x - 4)^2 - 7$

13. Since the vertex is $(2, 169.6)$, the maximum height is 169.6 metres.

14. a) $y = -0.02(x - 35)^2 + 25$
- b) 20.5 metres

15. a) F (it is presented in vertex form)
- b) T
- c) F (the largest number is 3)
- d) F (it is in zeroes form)
- e) T

16. $8x^2 - 6x + 1$

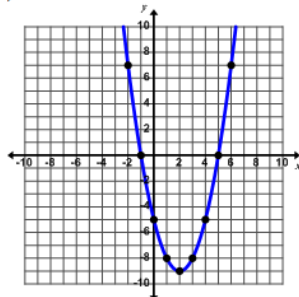
17. axis of symmetry: $x = 4$

18. the zeroes are $x = -4$ and $x = 0$

19. $y = 4x^2 - 24x + 44$

20. a) $x(x-36)$ b) $(x-4)(x+4)$ c) $(x-9)(x+3)$ d) $2(x-3)(x+1)$

21. a) $y = (x-5)(x+1)$ zeroes are $x=5$ and $x = -1$.
- b) $(2, -9)$
- c)



22. a) Let $h = 0$ and solve for "t" Final answer: $t = 6$ seconds
- b) This will occur at the vertex. So it will take only 3 seconds.