

Part I-Selected Response: 10 marks

Fill in the answers to the multiple choice questions on the sheet provided.

1) What is the x-intercept for the equation  $2x + 4y + 6 = 0$ ?

- a) -3
- b) -2
- c) 2
- d) 3

$$\begin{aligned}
 2x + 4(0) + 6 &= 0 \\
 2x + 6 &= 0 \\
 2x + 6 - 6 &= 0 - 6 \\
 2x &= -\frac{6}{2} \\
 x &= -3
 \end{aligned}$$

2) What is the y-intercept for the equation  $4x - 6y + 1 = 0$ ?

- a)  $-\frac{1}{6}$
- b)  $-\frac{1}{4}$
- c)  $\frac{1}{4}$
- d)  $\frac{1}{6}$

$$\begin{aligned}
 4(0) - 6y + 1 &= 0 \\
 -6y + 1 &= 0 \\
 -6y + 1 - 1 &= 0 - 1 \\
 -6y &= -1 \\
 \frac{-6y}{-6} &= \frac{-1}{-6} \\
 y &= \frac{1}{6}
 \end{aligned}$$

3) What are the x-intercepts for the equation  $-3x^2 + 48 = 0$ ?

- a)  $x = -4$
- b)  $x = 4$
- c)  $x = 16, x = -16$
- d)  $x = 4, x = -4$

$$\begin{aligned}
 -3(x^2 - 16) &= 0 \\
 -3(x+4)(x-4) &= 0 \\
 x+4 &= 0 & x-4 &= 0 \\
 x &= -4 & x &= 4
 \end{aligned}$$

4) What is  $-2x^3 + 8x^2 - 8x$  in completely factored form?

- a)  $-2(x^3 - 4x^2 + 4x)$
- b)  $-2x(x^2 - 4x + 4)$
- c)  $-2x(x+2)(x-2)$
- d)  $-2x(x-2)^2$

$$\begin{aligned}
 &-2x(x^2 - 4x + 4) \\
 &= -2x(x-2)(x-2) \\
 &= -2x(x-2)^2
 \end{aligned}$$

5) A graph produces x-intercepts of  $x = 2$  and  $x = -3$ . Which answer below indicates the equation for that graph?

- a)  $y = x^2 + x - 6$
- b)  $y = x^2 + x + 6$
- c)  $y = x^2 - x - 6$
- d)  $y = x^2 - x + 6$

$x = 2$        $x = -3$   
 $x - 2 = 2 - 2$        $x + 3 = -3 + 3$   
 $x - 2 = 0$        $x + 3 = 0$   
 $(x - 2)(x + 3) = 0$   
 $x^2 + 3x - 2x - 6 = 0$   
 $x^2 + x - 6 = 0$   
 $y = x^2 + x - 6$

6) Solve for n:  $3^n = 243$

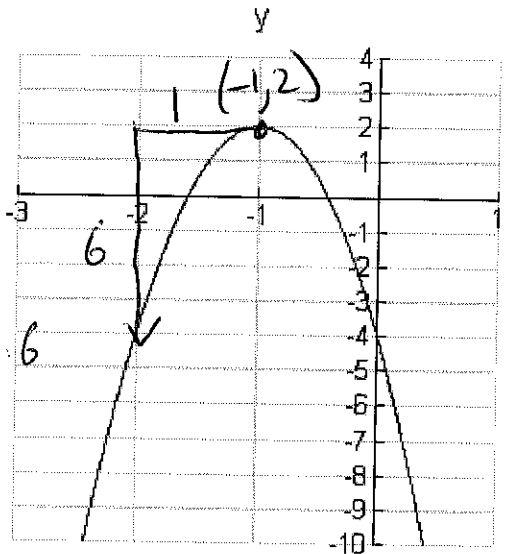
- a) 4
- b) 5
- c) 6
- d) 81

$3 \times 3 \times 3 \times 3 \times 3 = 243$   
 $3^5 = 243$   
 $3^n = 3^5$   
 $n = 5$

7) What is the equation that represents the graph to the right?

- a)  $-6(y + 2) = |x - 1|$
- b)  $-\frac{1}{6}(y - 2) = |x + 1|$
- c)  $-\frac{1}{6}(y - 2) = (x + 1)^2$
- d)  $-6(y + 2) = (x - 1)^2$

Vertex  $(-1, 2)$   
 horizontal translation =  $-1 - 3$   
 vertical translation =  $2$   
 vertical stretch =  $6$   
 reflected: yes



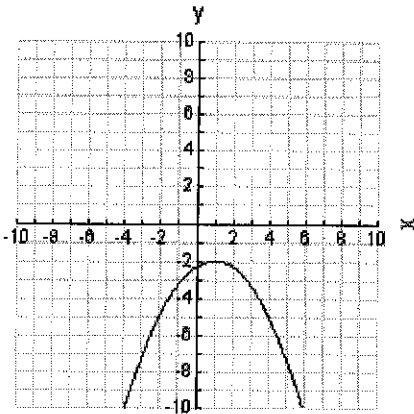
8) An absolute value function has a vertex of  $(-3, 7)$ , a vertical stretch of  $\frac{1}{5}$  and the graph does not appear to be reflected. Which answer below would represent the equation for the function?

- a)  $\frac{1}{5}(y + 7) = |x - 3|$
- b)  $-5(y - 7) = |x + 3|$
- c)  $5(y - 7) = |x + 3|$
- d)  $5(y - 7) = (x + 3)^2$

$5(y - 7) = |x + 3|$

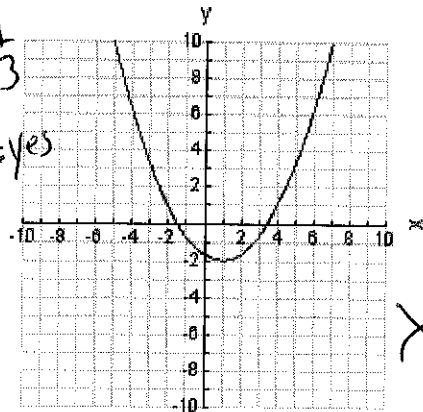
vertical translation =  $7$   
 horizontal translation =  $-3$   
 vertical stretch =  $\frac{1}{5}$   
 reflected: no

9) Which graph below best represents the equation  $-3(y+2) = (x-1)^2$ ?

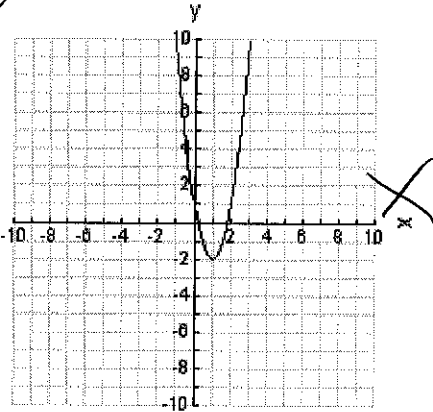


a)

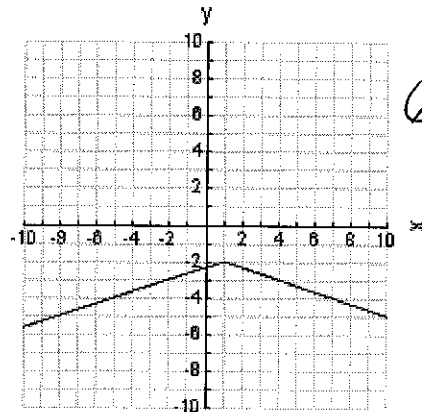
Vertical Stretch =  $\frac{1}{3}$   
reflected: yes



b)



c)



d)

not a parabola

10) The graph of  $y = x^2$  is transformed under the mapping notation of

$(x, y) \rightarrow \left(x - \frac{2}{5}, -\frac{4}{7}y + \frac{1}{2}\right)$ . Which equation below would represent the transformed graph?

a)  $-\frac{4}{7}\left(y + \frac{1}{2}\right) = \left(x - \frac{2}{5}\right)^2$

b)  $-\frac{7}{4}\left(y - \frac{1}{2}\right) = \left|x + \frac{2}{5}\right|^2$

c)  $-\frac{7}{4}\left(y - \frac{1}{2}\right) = \left(x + \frac{2}{5}\right)^2$

d)  $\frac{4}{7}\left(y - \frac{1}{2}\right) = \left(x + \frac{2}{5}\right)^2$

\* think opposite \*

$-\frac{7}{4}\left(y - \frac{1}{2}\right) = \left(x + \frac{2}{5}\right)^2$

Selected Response Answer Sheet

1	a
2	d
3	d
4	d
5	a
6	b
7	C
8	C
9	a
10	C

PART II: Constructed Response

Students are required to answer all questions in the space provided. All workings should be shown. Submit the answer sheet for Part I and all pages of Part II. Place your name on each page.

11) Solve the following for the indicated variable.

a)  $x^2 + x = 56$  (2 marks) ← basic factoring

$$x^2 + x - 56 = 0$$

$$(x+8)(x-7) = 0$$

$$\begin{array}{r} 8x - 7 = -56 \\ 8 + -7 = 1 \end{array}$$

$$\begin{array}{l} x+8=0 \\ x=-8 \end{array} \quad \begin{array}{l} x-7=0 \\ x=7 \end{array}$$

b)  $-3p^2 + 11p + 4 = 0$  (4 marks)

$$(-3p^2 + 12p) + (1p + 4) = 0$$

$$-3p(p-4) + 1(p-4) = 0$$

$$(p-4)(-3p-1) = 0$$

$$\begin{array}{l} p-4=0 \\ p-4+4=0+4 \\ p=4 \end{array}$$

$$\begin{array}{l} -3p-1=0 \\ -3p-1+1=0+1 \\ -3p=1 \\ \frac{-3p}{-3} = \frac{1}{-3} \\ p = -\frac{1}{3} \end{array}$$

$$\begin{array}{l} 12x - 1 = -12 \\ 12 + 1 = 11 \end{array}$$

c)  $-5(2^x) + 11 = -309$  (4 marks)

$$-5(2^x) + 11 = -309$$

$$-5(2^x) + 11 - 11 = -309 - 11$$

$$\frac{-5(2^x)}{-5} = \frac{-320}{-5}$$

$$2^x = 64$$

$$2^x = 2^6$$

$$\begin{array}{l} 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64 \\ 2^6 = 64 \end{array}$$

12) Simplify the following expressions.

a)  $\frac{2x^2 + 12x + 18}{2x^2 - 18}$  (5marks)  
 Numerator  
 Denominator

b)  $\frac{-2x^2 - 2x + 12}{x^2 + 2x - 3}$  (5marks)  
 Numerator  
 Denominator

Numerator  
 $2x^2 + 12x + 18$   
 $= 2(x^2 + 6x + 9)$   $\underline{3} \times \underline{3} = 9$   
 $= 2(x+3)(x+3)$   $\underline{3} + \underline{3} = 6$   
 Denominator

Numerator  
 $-2x^2 - 2x + 12$   
 $= -2(x^2 + x - 6)$   
 $= -2(x+3)(x-2)$   $\underline{3} \times \underline{-2} = -6$   
 $\underline{3} + \underline{-2} = 1$

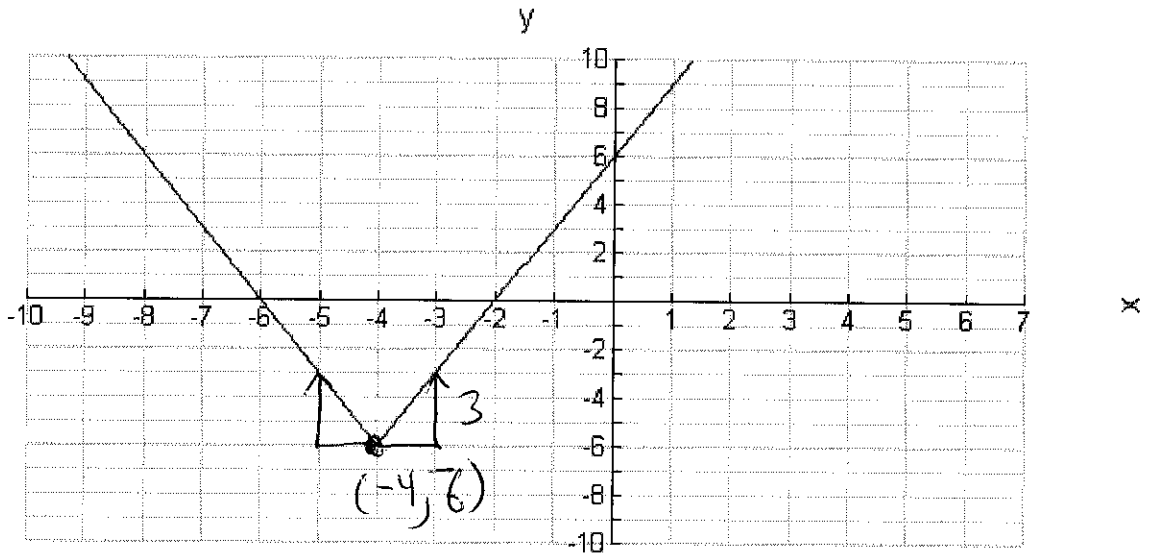
Denominator  
 $2x^2 - 18$   
 $= 2(x^2 - 9)$  Difference of Squares  
 $= 2(x+3)(x-3)$

Denominator  
 $x^2 + 2x - 3$   
 $= (x+3)(x-1)$   $\underline{3} \times \underline{-1} = -3$   
 $\underline{3} \times \underline{-1} = -2$

$\frac{2x^2 + 12x + 18}{2x^2 - 18} = \frac{2(x+3)(x+3)}{2(x+3)(x-3)}$   
 $= \frac{x+3}{x-3}$

$\frac{-2x^2 - 2x + 12}{x^2 + 2x - 3} = \frac{-2(x+3)(x-2)}{(x+3)(x-1)}$   
 $= \frac{-2(x-2)}{x-1}$

13) For the following graph, fill in the information as requested. Assume it is the transformation of the graph  $y = |x|$



Horizontal shift:

(1 mark) -4

Vertical translation:

(1 mark) -6

Vertical Stretch:

(1 mark) 3

Reflection... Yes or No

(1 mark) no

Equation:

(3 marks)

$$\frac{1}{3}(y + 6) = |x + 4|$$

Mapping Notation

(3 marks)

$$(x, y) \Rightarrow (x - 4, 3y - 6)$$

14) Complete the two tables of values, graph  $y = x^2$  and  $2(y+7) = (x-6)^2$  on the grid below. As well fill in the correct mapping notation as indicated below. Show all possible workings for full marks.

(3 marks)

$y = |x|$

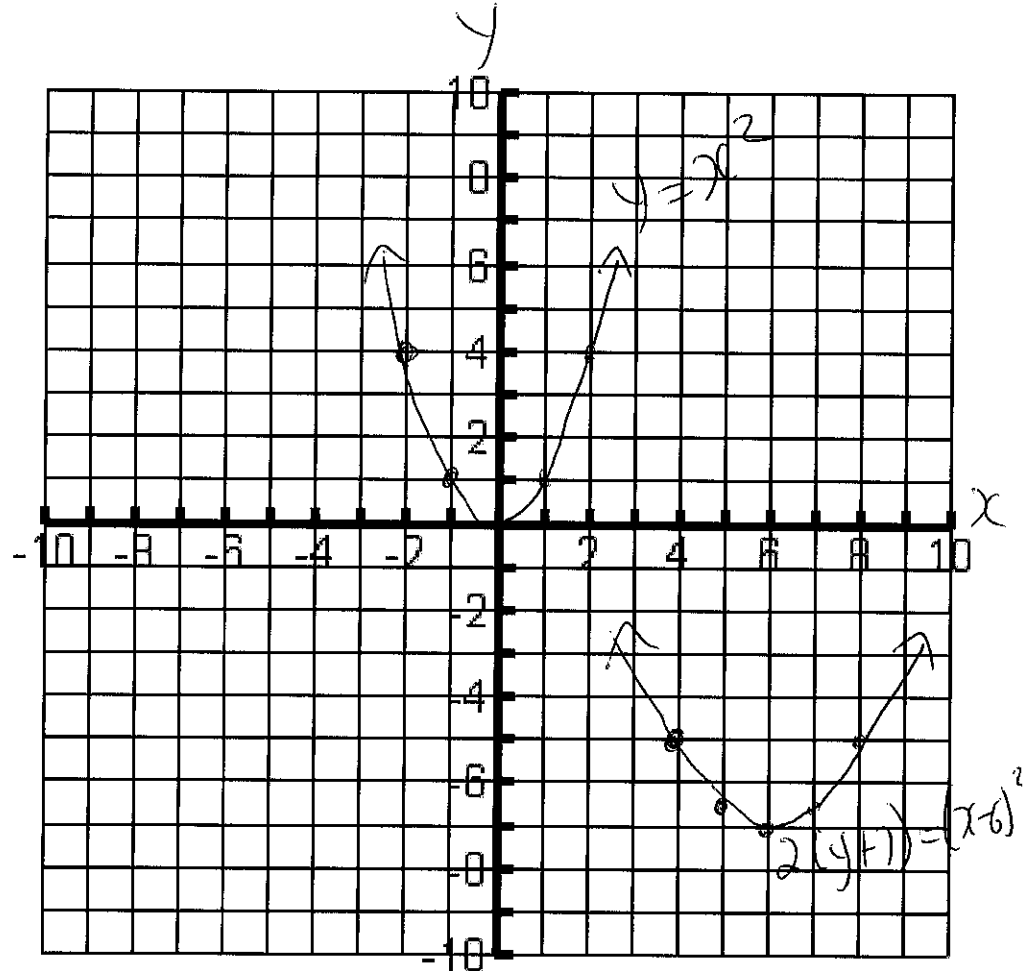
(2 marks)

x	y
-2	4
-1	1
0	0
1	1
2	4

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

(2 marks)

x	y
4	-5
5	-6.5
6	-7
7	-6.5
8	-5



Mapping Notation:  $(x, y) \rightarrow (x+6, \frac{1}{2}y-7)$  (3 marks)