

MATH 0320 29 Free Response

1. Factor $40x^3y^7 - 50x^5y^4$
2. Solve $x^2 + 14x + 24 = 0$
3. Solve $24 - 11x + x^2 = 0$
4. Solve $25x^2 - 64y^2$
5. Factor $xy - 5x - 7y + 35$
6. Solve $4x^2 + 16x + 15 = 0$
7. Solve $2x^3 + 28x^2 + 48x = 0$
8. Simplify $\frac{2x}{2x - 40}$
9. Simplify $\frac{4x^2 - 9}{8x} \cdot \frac{2x^7}{2x - 3}$
10. Simplify $\frac{-2a - 2b}{a + b}$
11. Simplify $\frac{x^2 + 3x + 2}{x^2 - 9} \div \frac{x + 2}{x + 3}$
12. $f(x) = 2x^2 - 3x + 10$, find $f(-4)$
13. Solve $|x + 2| = 8$
14. Solve $|x - 2| < 8$
15. Solve $|x - 3| > 8$
16. Solve $-8 \leq 2x - 10 \leq 200$
17. Simplify $\sqrt{28x^8y^{21}}$
18. Simplify $\sqrt[3]{64x^{12}y^{17}}$
19. Evaluate $(-3 - 7i) - (-2 + 10i)$
20. Evaluate $(3 - 5i)(-2 - 7i)$
21. Evaluate $1024^{3/10}$
22. Solve $\sqrt{x - 2} = 9$
23. Solve $(x - 2)^2 = 16$
24. Solve $x^2 + 2x + 1 = 7$
25. Solve $x^2 + 2x + 1 = -36$
26. Solve $x^2 - 10x = 0$
27. $f(x) = 51000(1.10)^x$, find $f(2)$
28. Graph $f(x) = -2x + 4$
29. Graph $f(x) = x^2 - 4$

factor

M032029 Prac + 5 step
103017

①

$$40x^3y^7 - 50x^5y^4 =$$

①

$$10x^3y^4(4y^3 - 5x^2) =$$

Solve

$$x^2 + 14x + 24 = 0$$
$$(x + 2)(x + 12) = 0$$

Let $x + 2 = 0$ OR $x + 12 = 0$

$$x + 2 - 2 = 0 - 2 \text{ OR } x + 12 - 12 = 0 - 12$$

$$x = -2 \text{ OR } x = -12$$

possibly

24.1

12.2

6.4

3.8

2

Use Quadratic Formula

$$x^2 + 14x + 24 = 0$$

$$a = 1, b = 14, c = 24$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(14) \pm \sqrt{(14)^2 - 4(1)(24)}}{2(1)}$$

$$x = \frac{-14 \pm \sqrt{196 - 96}}{2}$$

$$x = \frac{-14 \pm \sqrt{100}}{2}$$

$$x = \frac{-14 \pm 10}{2}$$

$$x = -7 \pm 5$$

$$x = -7 + 5 \text{ OR } x = -7 - 5$$

$$x = -2 \text{ OR } x = -12$$

3

Solve

$$24 - 11x + x^2 = 0$$

$$x^2 - 11x + 24 = 0 \text{ rewrite}$$

$$(x-3)(x-8) = 0$$

$$\text{or } x-3=0 \text{ OR } x-8=0$$

$$x-3+3=0+3 \text{ OR } x-8+8=0+8$$

$$x=3 \text{ OR } x=8$$

Possible
2+11
1+24
6+4
3+8

3

Use Quadratic formula

$$x^2 - 11x + 24 = 0$$

$$a=1, b=-11, c=24$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(1)(24)}}{2(1)}$$

$$x = \frac{11 \pm \sqrt{121 - 96}}{2}$$

$$x = \frac{11 \pm \sqrt{25}}{2}$$

$$x = \frac{11 \pm 5}{2}$$

$$x = \frac{11-5}{2} \text{ OR } x = \frac{11+5}{2}$$

$$x = \frac{6}{2} \text{ OR } x = \frac{16}{2}$$

$$x=3 \text{ OR } x=8$$

④

factor

$$25x^2 - 64y^2 =$$

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

$$(5x + 8y)(5x - 8y) =$$

formula

$$a^2 - b^2 = (a+b)(a-b)$$

④

5.

factor by (grouping)

6

$$xy - 5x - 7y + 35 =$$

$$(xy - 5x) + (-7y + 35) =$$

$$x(y - 5) - 7(y - 5) =$$

$$(y - 5)(x - 7) =$$

Solve

6 $4x^2 + 16x + 15 = 0$

$(2x+3)(2x+5) = 0$

or $2x+3=0$ OR $2x+5=0$

$2x+3-3=0-3$ OR $2x+5-5=0-5$

$2x=-3$ OR $2x=-5$

$\frac{2x}{2} = \frac{-3}{2}$ OR $\frac{2x}{2} = \frac{-5}{2}$

$x = -\frac{3}{2}$ OR $x = -\frac{5}{2}$

Possible

$\frac{4}{22}$

$\frac{15}{3.5}$

6

Use Quadratic formula

$4x^2 + 16x + 15 = 0$

$a=4, b=16, c=15$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-(16) \pm \sqrt{(16)^2 - 4(4)(15)}}{2(4)}$

$x = \frac{-16 \pm \sqrt{256 - 240}}{8}$

$x = \frac{-16 \pm \sqrt{16}}{8}$

$x = \frac{-16 \pm 4}{8}$

$x = \frac{-16+4}{8}$ OR $x = \frac{-16-4}{8}$

$x = \frac{-12}{8}$ OR $x = \frac{-20}{8}$

$x = \frac{4(-3)}{4(2)}$ OR $x = \frac{4(-5)}{4(2)}$

$x = -\frac{3}{2}$ OR $x = -\frac{5}{2}$

Solve

7

$$2x^3 + 28x^2 + 48x = 0$$

$$2x(x^2 + 14x + 24) = 0$$

$$2x(x+2)(x+12) = 0$$

$$\text{At } 2x = 0 \quad \text{OR} \quad x+2 = 0 \quad \text{OR} \quad x+12 = 0$$

$$\frac{2x}{2} = \frac{0}{2} \quad \text{OR} \quad x+2-x = 0-2 \quad \text{OR} \quad x+12-12 = 0-12$$

$$x = 0 \quad \text{OR} \quad x = -2 \quad \text{OR} \quad x = -12$$

Possible

$$\begin{array}{r} 24 \cdot 1 \\ \hline 12 \cdot 2 \\ 6 \cdot 4 \\ 3 \cdot 8 \end{array} \quad \text{7}$$

Simplify

8

$$\frac{2x}{2x-40} =$$

$$\frac{2(x)}{2(x-20)} =$$

$$\frac{\cancel{2}(x)}{\cancel{2}(x-20)} =$$

$$\frac{x}{x-20} =$$

8

simplifying

9.

$$\frac{4x^2 - 9}{8x} \cdot \frac{2x^7}{2x-3} =$$

$$\frac{(2x)^2 - (3)^2}{8x} \cdot \frac{2x^7}{2x-3} =$$

$$\frac{(2x+3)(2x-3)}{8x} \cdot \frac{2x^7}{(2x-3)} =$$

$$\frac{(2x+3)\cancel{(2x-3)}}{8x} \cdot \frac{2x^7}{\cancel{(2x-3)}} =$$

$$\frac{(2x+3)2x^7}{8x^1} =$$

$$\frac{(2x+3)\cancel{(2)}x^{7-1}}{\cancel{(2)}(4)} =$$

$$\frac{(2x+3)x^6}{4} =$$

$$\frac{x^6(2x+3)}{4} =$$

9

formula
 $a^2 - b^2 = (a+b)(a-b)$

Law of exponents

Simplify

10.

$$\frac{-2a-2b}{a+b} =$$

10.

$$\frac{-2(a+b)}{a+b} =$$

$$\frac{\cancel{-2(a+b)}}{\cancel{(a+b)}} =$$

$$-2 =$$

Simplify

(11)

$$\frac{x^2 + 3x + 2}{x^2 - 9} \div \frac{x+2}{x+3} =$$

(11)

$$\frac{x^2 + 3x + 2}{x^2 - 9} \cdot \frac{x+3}{x+2} = \text{rewrite.}$$

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

formula
 $a^2 - b^2 = (a+b)(a-b)$

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

$$\frac{(x+1)\cancel{(x+2)}}{\cancel{(x+3)}(x-3)} \cdot \frac{\cancel{(x+3)}}{\cancel{(x+2)}} =$$

$$\frac{x+1}{x-3} =$$

12. $f(x) = 2x^2 - 3x + 10$ find $f(-4)$

$$f(-4) = 2(-4)^2 - 3(-4) + 10$$

12

$$f(-4) = 2(-4)(-4) - 3(-4) + 10$$

$$f(-4) = 2(16) - 3(-4) + 10$$

$$f(-4) = 32 + 12 + 10$$

$$f(-4) = 44 + 10$$

$$f(-4) = 54$$

Solve

13

$$|x+2|=8$$

formula

$$|x|=a$$

$$x=-a \text{ OR } x=a$$

let

$$x+2=-8 \quad \text{OR} \quad x+2=8$$

$$x+x-x=-8-2 \quad \text{OR} \quad x+2-2=8-2$$

$$x=-10$$

OR

$$x=6$$



Yes two dots (points only).

Solve

14

$$|x-2| < 8$$

$$-8 < x-2 < 8$$

$$-8 + 2 < x-2 + 2 < 8 + 2$$

$$-6 < x < 10$$



$$(-6, 10)$$

formula

$$|x| < a$$
$$-a < x < a$$

14

Solve

15. $|x-3| > 8$

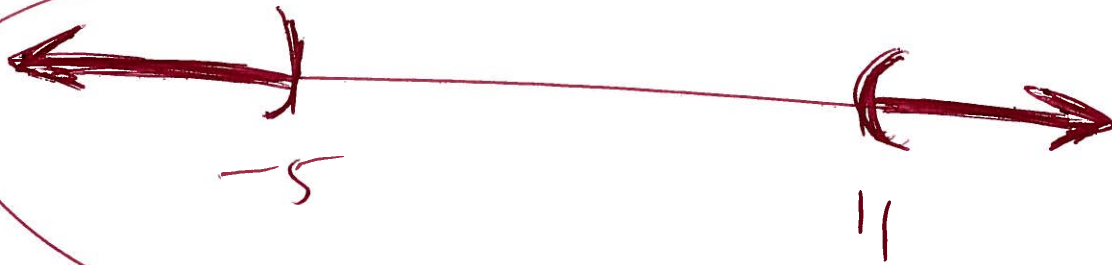
Formula
 $|x| > a$

$$x-3 < -8 \quad \text{OR} \quad x-3 > 8$$

$$x-3+3 < -8+3 \quad \text{OR} \quad x-3+3 > 8+3$$

$$x < -5$$

$$\text{OR} \quad x > 11$$



$$(-\infty, -5) \cup (11, \infty)$$

Solve

16

16

$$-8 \leq 2x - 10 \leq 200$$

$$-8 + 10 \leq 2x - \cancel{10} + \cancel{10} \leq 200 + 10$$

$$2 \leq 2x \leq 210$$

$$\frac{2}{2} \leq \frac{2x}{2} \leq \frac{210}{2}$$

$$1 \leq x \leq 105$$



$$[1, 105]$$

Simplify

17. $\sqrt{28x^8y^{21}}$ =

$\sqrt{2^2 \cdot 7^1 x^8 y^{20} y^1}$ =

$2^1 x^4 y^{10} \sqrt{7^1 y^1}$ =

divide powers

Primes 2, 3, 5, 7, ...

$\begin{array}{r} 2 \overline{) 28} \end{array}$

$\begin{array}{r} 2 \overline{) 14} \end{array}$

$\begin{array}{r} 7 \overline{) 7} \\ 1 \end{array}$

$2x^4y^{10}\sqrt{7y}$ =

simplify

18.

$$\sqrt[3]{64x^{12}y^{17}} =$$

Primes 2, 3, 5, 7, ...

18.

$$\sqrt[3]{2^6 x^{12} y^{15} y^2} =$$

$$2^2 x^4 y^5 \sqrt[3]{y^2} =$$

$$2 \cdot 2 x^4 y^5 \sqrt[3]{y^2} =$$

$$4x^4 y^5 \sqrt[3]{y^2} =$$

divide power

2	64
2	32
2	16
2	8
2	4
2	2
	1

Simplify

19

$$(-3 - 7i) - (-2 + 10i) =$$

$$-3 - 7i + 2 - 10i =$$

$$-1 - 17i =$$

$a + bi$ form

19

simplify

20

$$(3-5i)(-2-7i) =$$

20

$$-6 - 21i + 10i + 35i^2 =$$

$$-6 - 11i + 35i^2 =$$

$$-6 - 11i + 35(-1) =$$

$$-6 - 11i - 35 =$$

$$-41 - 11i =$$

a+bi form

formula

$$i^2 = -1$$

Evaluate

21.

$$1024^{\frac{3}{10}} =$$

Primes 2, 3, 5, 7, ...

21

$$(2^{10})^{\frac{3}{10}} =$$

$$(2^{\frac{10}{1}})^{\frac{3}{10}} =$$

$$2^{\frac{10(3)}{1(10)}} =$$

divide powers

$$2^{\frac{3}{1}} =$$

$$2^3 =$$

$$2 \cdot 2 \cdot 2 =$$

$$8 =$$

$$\begin{array}{r}
 2 \overline{) 1024} \\
 \underline{2} \\
 2 \\
 \underline{2} \\
 2 \\
 \underline{2} \\
 0
 \end{array}$$

Solve

22. $\sqrt{x-2} = 9$

22.

$$(\sqrt{x-2})^2 = (9)^2$$

$$x-2 = 81$$

$$x - \cancel{2} + \cancel{2} = 81 + 2$$

$$x = 83$$

Check

$$\sqrt{x-2} = 9$$

$$\sqrt{83-2} = 9$$

$$\sqrt{81} = 9$$

$$9 = 9$$

Good ✓

Solve

23

23

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

$$\sqrt{(x-2)^2} = \pm\sqrt{16}$$

$$x-2 = \pm 4$$

wt $x-2 = -4$ OR $x-2 = 4$

~~$x-2+2 = -4+2$~~ OR ~~$x-2+2 = 4+2$~~

$x = -2$ OR $x = 6$

check

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

$$(-2-2)^2 = 16$$

$$(-4)^2 = 16$$

$$(-4)(-4) = 16$$

$$16 = 16 \checkmark$$

check

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

$$(6-2)^2 = 16$$

$$(4)^2 = 16$$

$$(4)(4) = 16$$

$$16 = 16 \checkmark$$

24. Solve use Quadratic formula

$$x^2 + 2x + 1 = 7$$

$$x^2 + 2x + 1 - 7 = 7 - 7$$

$$1x^2 + 2x - 6 = 0$$

$$a=1, b=2, c=-6$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(1)(-6)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 + 24}}{2}$$

$$x = \frac{-2 \pm \sqrt{28}}{2}$$

$$x = \frac{-2 \pm \sqrt{4 \cdot 7}}{2}$$

$$x = \frac{-2 \pm \sqrt{4} \sqrt{7}}{2}$$

$$x = \frac{-2 \pm 2\sqrt{7}}{2}$$

24

Prime
2, 3, 5, 7, ...

$$\begin{array}{r} 2 \overline{) 28} \\ 4 \\ \hline 28 \\ \hline 0 \end{array}$$

$$x = -1 \pm 1\sqrt{7} \quad \text{divide}$$

$$x = -1 \pm \sqrt{7} \quad \text{simplify}$$

$$x = -1 - \sqrt{7} \quad \text{OR} \quad x = -1 + \sqrt{7}$$

25. Solve using Quadratic formula

$$x^2 + 2x + 1 = -36$$

$$x^2 + 2x + 1 + 36 = -36 + 36$$

$$1x^2 + 2x + 37 = 0$$

$$a=1, b=2, c=37$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(1)(37)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 - 148}}{2}$$

$$x = \frac{-2 \pm \sqrt{-144}}{2}$$

$$x = \frac{-2 \pm 12i}{2}$$

$$x = -1 \pm 6i$$

$$x = -1 - 6i \text{ OR}$$

$$x = -1 + 6i$$

25.

Formula

$$\sqrt{-1} = i$$

Solve

$$(26) \quad X^2 - 10X = 0$$

(26)

$$X(X-10) = 0$$

factor

$$\text{either } X=0 \quad \text{OR} \quad X-10=0$$

$$X=0 \quad \text{OR} \quad X-\cancel{10}+\cancel{10}=0+10$$

$$X=0$$

$$\text{OR } X=10$$

ck

$$X^2 - 10X = 0$$

$$(0)^2 - 10(0) = 0$$

$$(0)(0) - 10(0) = 0$$

$$0 - 0 = 0$$

$$0 = 0 \quad \checkmark$$

Good

ck

$$X^2 - 10X = 0$$

$$(10)^2 - 10(10) = 0$$

$$(10)(10) - 10(10) = 0$$

$$100 - 100 = 0 \quad \checkmark$$

$$0 = 0$$

Good

(27)

(27) $f(x) = 51,000 (1.10)^x$ find $f(2)$

$f(2) = 51,000 (1.10)^2$

$f(2) = 51,000 (1.10)(1.10)$

$f(2) = 51,000 (1.21)$

$f(2) = 61,710$

51000 mult
 × 1.21

 51000
 102000

 61,710.00

2 decimal Places

1.10 mult
 × 1.10

 000
 110
 110

 1.2100
 1.21

4 decimal Places

28. graph

$$f(x) = -2x + 4$$

$$f(0) = -2(0) + 4$$

$$f(0) = 0 + 4$$

$$f(0) = 4$$

(28.)

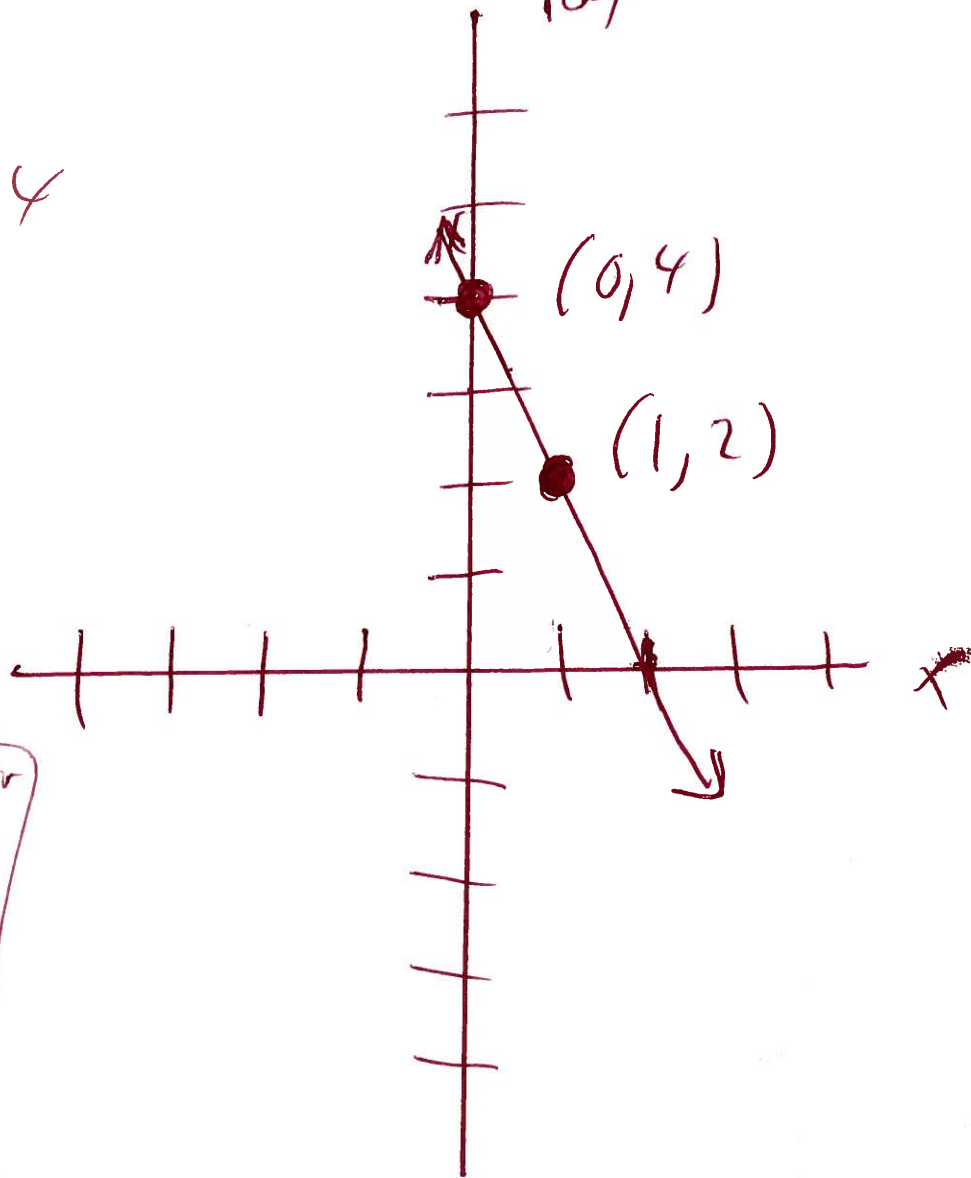
x	f(x)
0	4
1	2

$$f(1) = -2(1) + 4$$

$$f(1) = -2 + 4$$

$$f(1) = 2$$

f(x)



OL

use graphing calculator

$$x_{\min} = -12$$

$$x_{\max} = 12$$

$$x_{\text{SCL}} = 1$$

$$y_{\min} = -10$$

$$y_{\max} = 10$$

$$y_{\text{SCL}} = 1$$

$$y_1 = -2x + 4$$

Little
minus
sign

29 graph
 $f(x) = x^2 - 4$

$f(-2) = (-2)^2 - 4$
 $f(-2) = (-2)(-2) - 4$
 $f(-2) = 4 - 4$
 $f(-2) = 0$

$f(-1) = (-1)^2 - 4$
 $f(-1) = (-1)(-1) - 4$
 $f(-1) = 1 - 4$
 $f(-1) = -3$

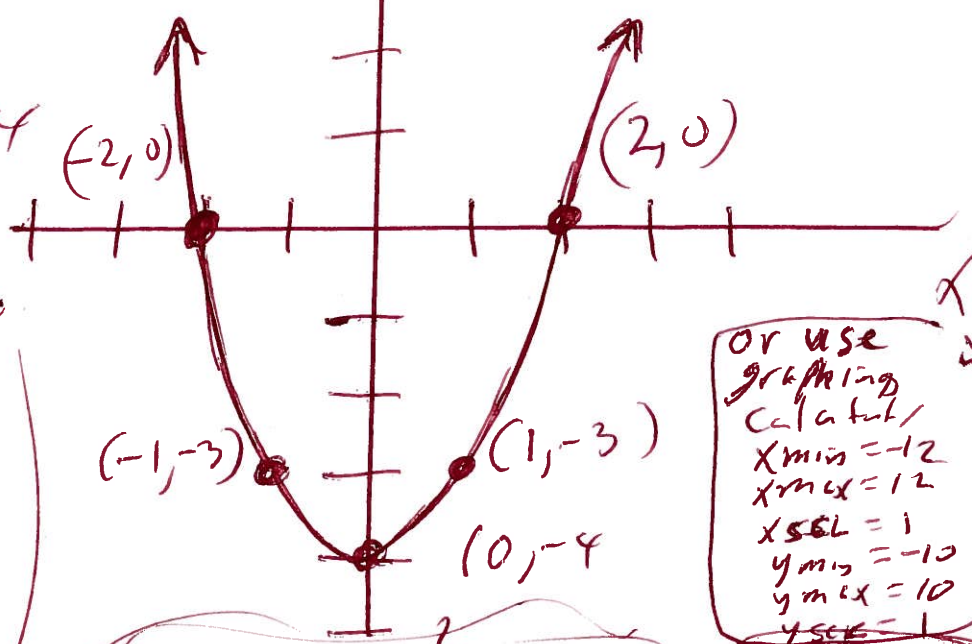
$f(0) = (0)^2 - 4$
 $f(0) = (0)(0) - 4$
 $f(0) = 0 - 4$
 $f(0) = -4$

$f(1) = (1)^2 - 4$
 $f(1) = (1)(1) - 4$
 $f(1) = 1 - 4$
 $f(1) = -3$

$f(2) = (2)^2 - 4$
 $f(2) = (2)(2) - 4$
 $f(2) = 4 - 4$
 $f(2) = 0$

(29)

X	f(x)
-2	0
-1	-3
0	-4
1	-3
2	0



or use
 graphing
 calculator
 $x_{min} = -12$
 $x_{max} = 12$
 $x_{scl} = 1$
 $y_{min} = -10$
 $y_{max} = 10$
 $y_{scl} = 1$

$f(x) = x^2 - 4$
 BIG minus
 sign

Vertex = (0, -4)
 axis of symmetry $x = 0$
 minimum