

**NEW YORK STATE
COMPONENT RETEST**

**MATHEMATICS A
COMPONENT 7
TASK 2**

MONDAY, APRIL 29, 2002

**SCORING KEY
AND
RATING GUIDE**

Multiple Choice Key

1	2
2	3
3	4
4	2
5	2
6	2

COMPONENT 7
MODULE 2

QUESTION 7

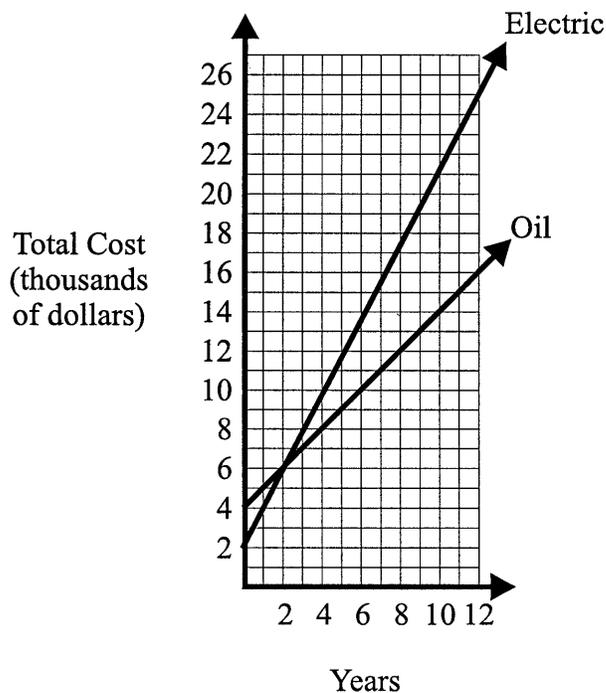
TRAINING SET

Part II

Answer all questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

- 7 Mr. Abernathy is planning to build a new apartment complex. He is considering two systems for heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil systems to heat his apartment complex.

Comparison of Home Heating Systems



For which heating system does the cost increase at the greatest rate? Explain your answer.

At one year, which system is cheaper, and by approximately how many thousands of dollars?

Sample Response:

Electric, as the slope of the line for electric is steeper.

or

Electric, as the slope of the electric line is $\frac{10-6}{4-2} = 2$ and the slope of the oil line is

$$\frac{8-6}{4-2} = 1.$$

or

The cost of electric increases by \$2,000 each year while the cost of oil increases by \$1,000.

and

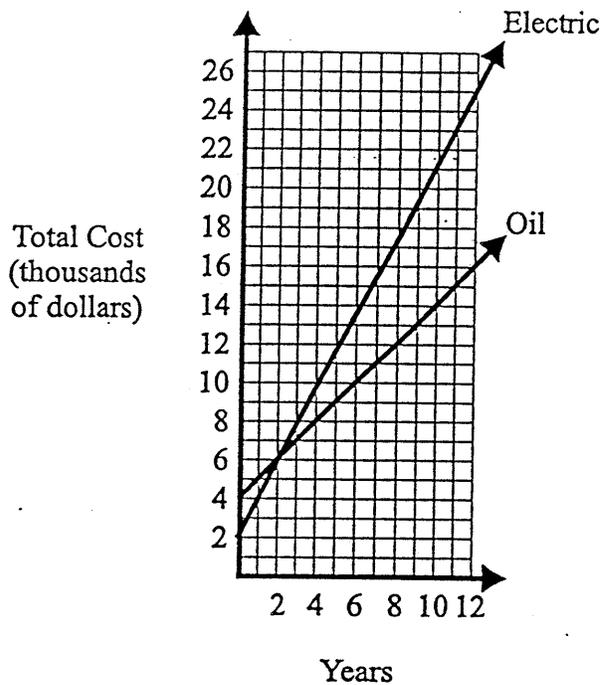
Electric by \$1,000.

Rubric:

- [4] Electric and electric by \$1,000 appropriate work is shown, and an appropriate explanation is given, such as those shown in the sample response.
- [3] Electric with incomplete explanation, and electric by \$1,000 or electric with a correct explanation and either electric or \$1,000.
or
- [3] If shown, work is appropriate, but one computational error is made, such as \$2,000 instead of \$1,000 for the second part.
- [2] Appropriate work is shown, but more than one computational error is made.
or
- [2] Appropriate work is shown, but one conceptual error is made.
or
- [2] Only the correct heating method that increases at the greatest rate, and a correct explanation is given; or only the correct cheaper method at one year and a correct dollar amount is given, and appropriate work is shown.
- [1] Electric and electric by \$2,000.00, (instead of \$1,000) and no explanation is given.
(paper #1)
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

- 8 Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

The cost of electric heating increases at the greatest rate. You can tell this because the slope of that line is steeper.

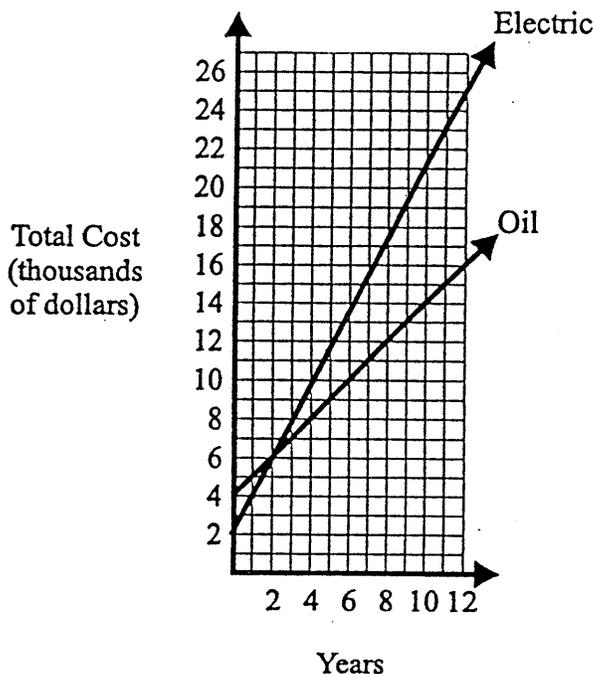
At one year, which method is cheaper, and by approximately how many thousands of dollars?

At one year the cost of electric heating is cheaper by approximately \$1,000.

SCORE POINT: 4

- 8 Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

Electric, because it goes from 2,000 to 25,000 in 12 years

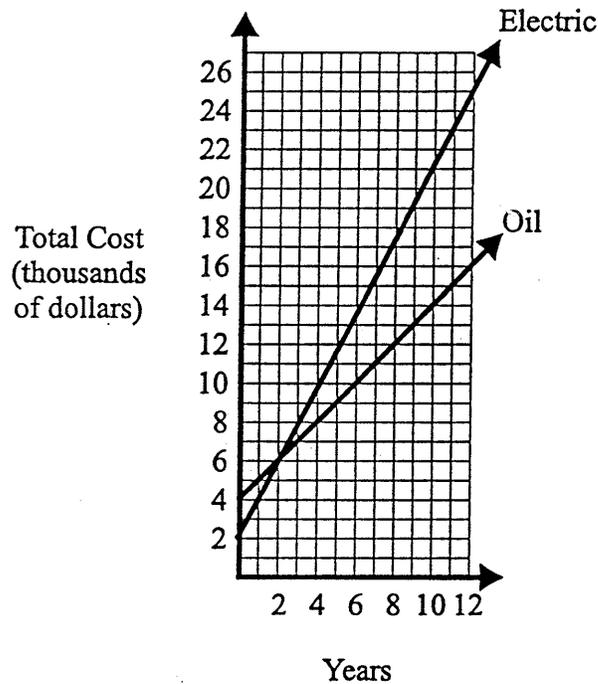
At one year, which method is cheaper, and by approximately how many thousands of dollars?

Electric by approximately \$1,000

SCORE POINT: 3

Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

Rate of electric = $\frac{12-0}{25-4} = 0.57$ Rate of oil = $\frac{12-0}{16-4} = 1$ so oil has a greater rate.

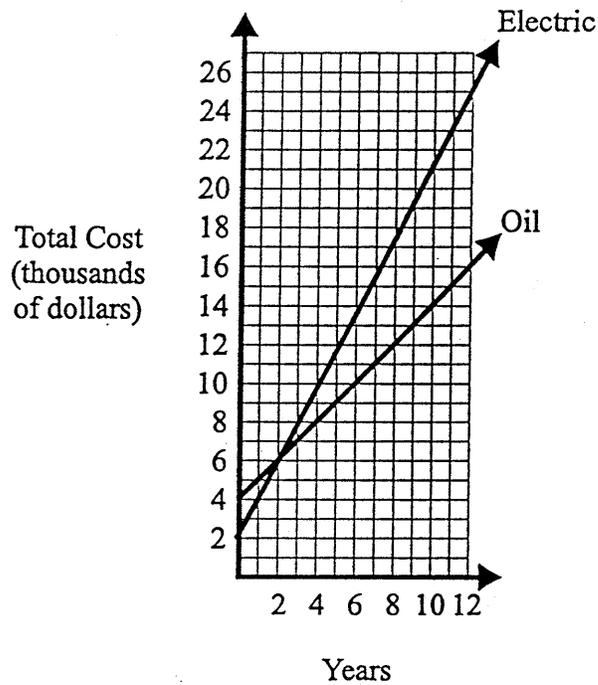
At one year, which method is cheaper, and by approximately how many thousands of dollars?

Electric is cheaper by 0,000

SCORE POINT: 2

Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

RATE?

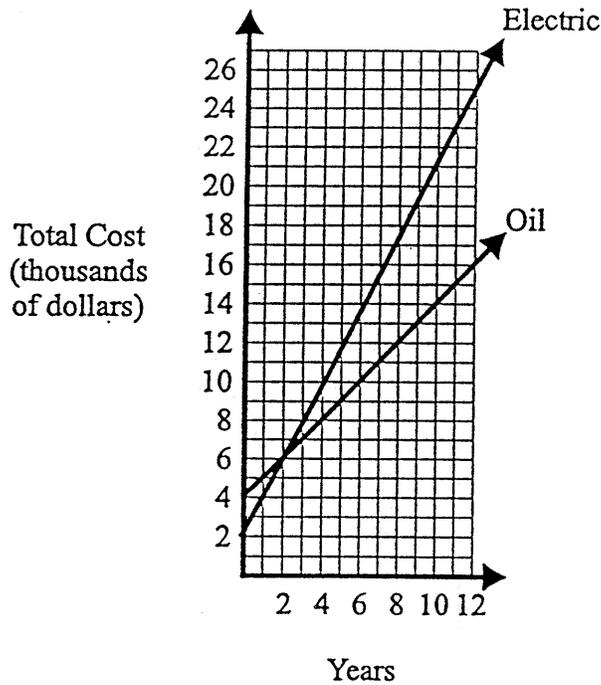
At one year, which method is cheaper, and by approximately how many thousands of dollars?

*ELECTRIC
BY \$1,000*

SCORE POINT: 2

- 8 Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

Electric because with that electric is use for other things in a house

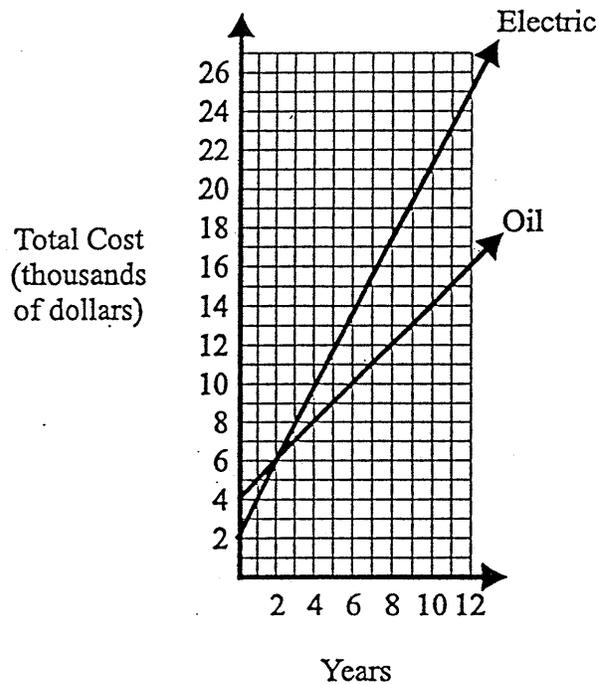
At one year, which method is cheaper, and by approximately how many thousands of dollars?

Electric by approx 2,000

SCORE POINT: 1

- 8 Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

Electric Increases by 4,000 each year.

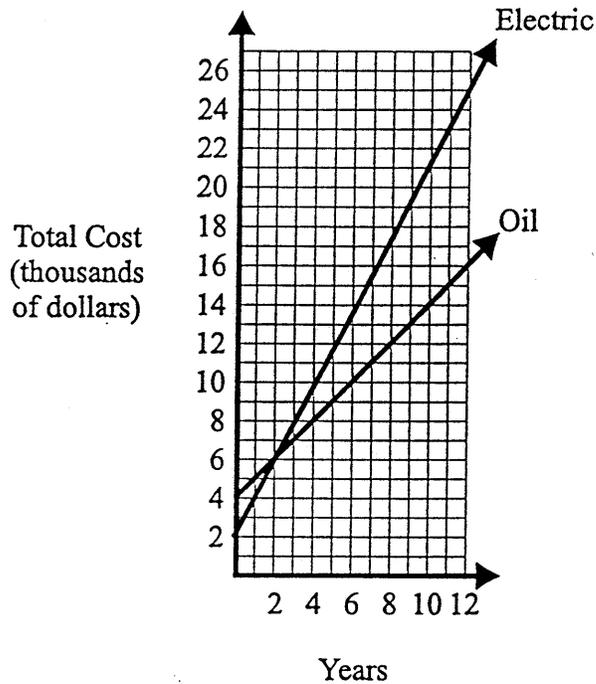
At one year, which method is cheaper, and by approximately how many thousands of dollars?

7,000

Score Point: 0

Mr. Abernathy is planning to build a new apartment complex. He is considering two methods of heating his apartment complex, electric and oil. The accompanying graph shows the comparison of total costs of using electric and oil to heat his apartment complex.

Comparison of Home Heating Systems



For which heating method does the cost increase at the greatest rate? Explain your answer.

Electric

At one year, which method is cheaper, and by approximately how many thousands of dollars?

Electric

Score Point: 0

COMPONENT 7
MODULE 2

QUESTION 8

TRAINING SET

- 8 A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

- 8 A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

Sample Response:

1st time produces 10,000 joules; 2nd time produces 8,000 joules; 3rd time produces 6,400 joules; 4th time produces 5,120 joules; 5th time produces 4,096 joules; 6th time produces 3,276.8 joules; and 7th time produces 2,621.44 joules.

Rubric

[4] 6, and appropriate work is shown, such as the method shown in the sample response.

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but more than one computational error is made.

or

[2] 6, but the work shown is vague or incomplete.

or

[2] Appropriate work is shown, but a conceptual error is made.

[1] 6, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

$$10000 \times 0.2 = 2000$$

$$10000 - 2000 = 8000 \cdot 0.2 = 1600$$

$$8000 - 1600 = 6400 \cdot 0.2 = 1280$$

$$6400 - 1280 = 5120 \cdot 0.2 = 1024$$

$$5120 - 1024 = 4096 \cdot 0.2 = 819.2$$

$$4096 - 819.2 = 3276.8 \cdot 0.2 = 655.36$$

$$3276.8 - 655.36 = 2621.44$$

The machine can be used 6 times before it produces less than 3000 joules of energy.

SCORE POINT: 4

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

$$\begin{array}{r} 10,000 \\ .2 \\ \hline \end{array}$$

3,000

4

$$\begin{array}{r} 5120 \\ .2 \\ \hline 10240 \end{array}$$

The machine ~~can~~ can be used 6x until it produces less than 3000 joules

$$\begin{array}{r} 10000 \\ .2 \\ \hline 20000 \end{array}$$

$$\begin{array}{r} 10000 \\ - 2000 \\ \hline 8000 \\ .2 \\ \hline \end{array}$$

2

16000

$$\begin{array}{r} 16000 \\ - 3200 \\ \hline 12800 \\ .2 \\ \hline \end{array}$$

3

12800

$$\begin{array}{r} 12800 \\ - 2560 \\ \hline 10240 \\ .2 \\ \hline \end{array}$$

5

$$\begin{array}{r} 5120 \\ 1024 \\ \hline 4096 \\ .2 \\ \hline \end{array}$$

819.2

$$\begin{array}{r} 4096 \\ - 819.2 \\ \hline \end{array}$$

3276.8

6

$$\begin{array}{r} 3276.8 \\ - 655.36 \\ \hline 2621.44 \end{array}$$

SCORE POINT: 4

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

	10,000	↓ 20%
1 st	10,000	
2 nd	8000	- 20%
3 rd	6400	- 20%
4 th	5120	- 20%
5 th	4096	- 20%
6 th	3276.8	- 20%
7 th	2621.44	- 20%

The machine can be used after 7 times before it produces less than 3,000 joules of energy. At 7 times it produces 2621.44 joules of energy.

SCORE POINT: 3

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

$$\begin{array}{r} 10,000 \\ \times .20 \\ \hline 2,000 \end{array}$$

$$\begin{array}{r} 10,000 \quad 1 \\ - 2,000 \\ \hline 8,000 \quad 2 \\ - 1,600 \\ \hline 6,400 \quad 3 \\ - 1,280 \\ \hline 5,120 \quad 4 \\ - 1,024 \\ \hline 4,096 \quad 5 \\ - 819.2 \\ \hline 3,276.8 \quad 6 \\ - 655.36 \\ \hline 2,621.44 \quad 7 \end{array}$$

7 TIMES

SCORE POINT: 2

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

6 times

SCORE POINT: 1

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

The machine could be used 7 times before it produces less than 3,000 joules of energy

Score Point: 0

A fuel produces 10,000 joules of energy the first time it is used in a machine. The number of joules of energy it produces decreases by 20% every time the machine is used. How many times can the machine be used before it produces less than 3,000 joules of energy?

$$\frac{x}{100} = \frac{20}{10000}$$

$$\frac{10000x}{10000} = \frac{2000}{10000}$$

$$x = 15 \text{ times}$$

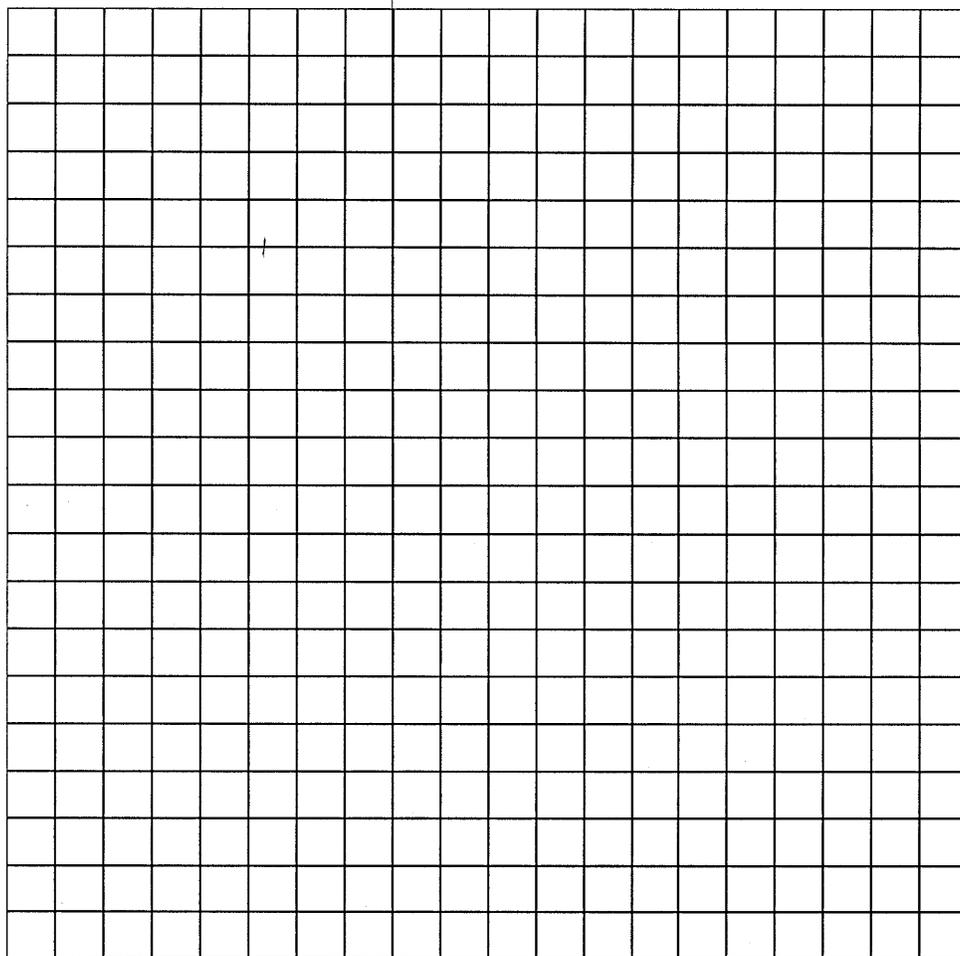
Score Point: 0

COMPONENT 7
MODULE 2

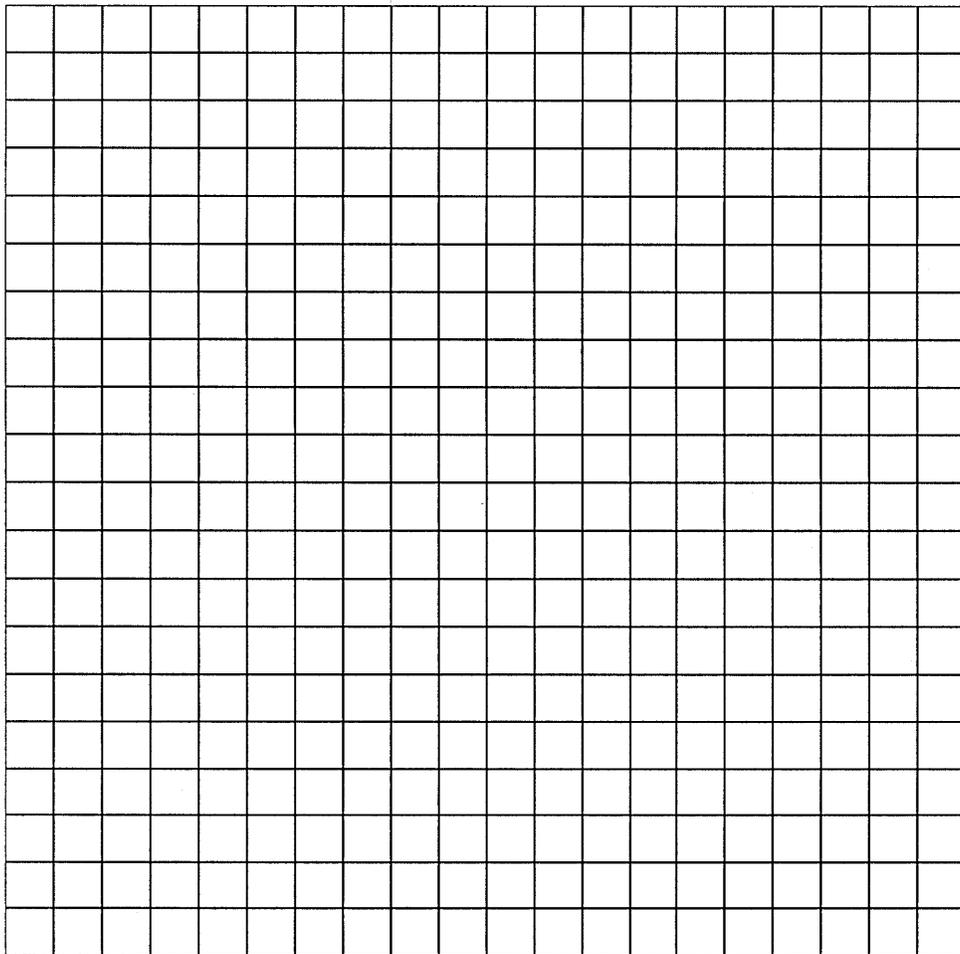
QUESTION 9

TRAINING SET

- 9 Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.

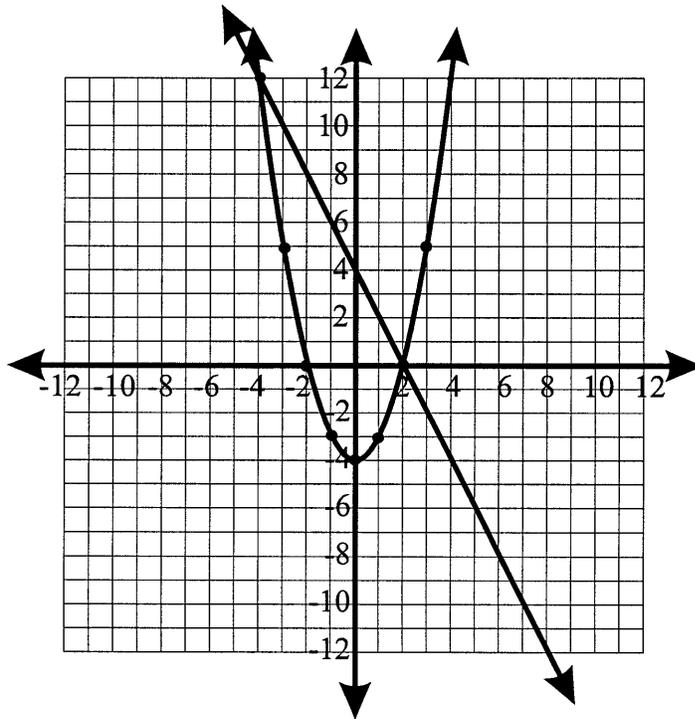


- 9 State the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



Sample Response:

$$\begin{aligned}x^2 - 4 &= -2x + 4 \\x^2 + 2x - 8 &= 0 \\(x + 4)(x - 2) &= 0 \\x &= -4, x = 2 \\(-4, 12) \quad (2, 0)\end{aligned}$$



Rubric

[4] $(-4, 12)$ and $(2,0)$ and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or

[3] In a graphic solution, both graphs are correct, but an incorrect or no solution is given.

[2] Appropriate work is shown, but more than one computational error is made.

or

[2] Appropriate work is shown, but one conceptual error is made.

or

[2] Only one graph of equal difficulty is drawn correctly, but appropriate points are indicated.

[1] Both graphs are drawn incorrectly, but an appropriate solution set is given.

or

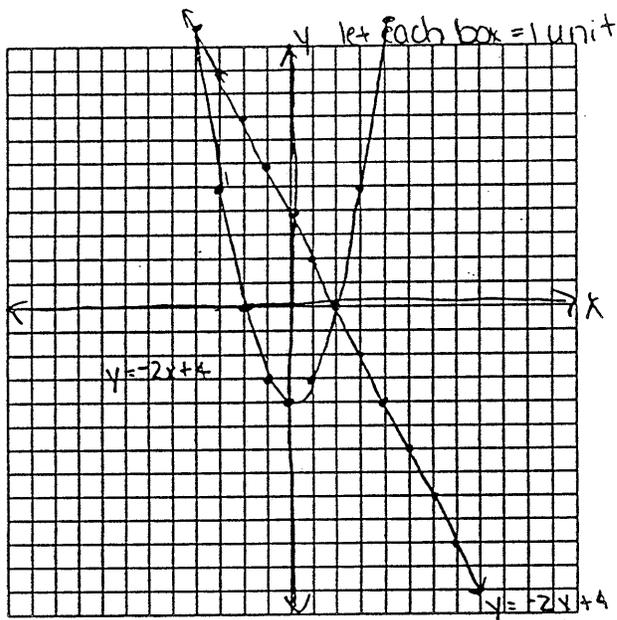
[1] Only one graph is drawn correctly, and no point or incorrect points are given.

or

[1] $(-4, 12)$ and $(2,0)$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



x	$y = x^2 - 4$	Y
-4	16 - 4	12
-3	9 - 4	5
-2	4 - 4	0
-1	1 - 4	-3
0	-4	-4
1	1 - 4	-3
2	4 - 4	0
3	9 - 4	5
4	16 - 4	12

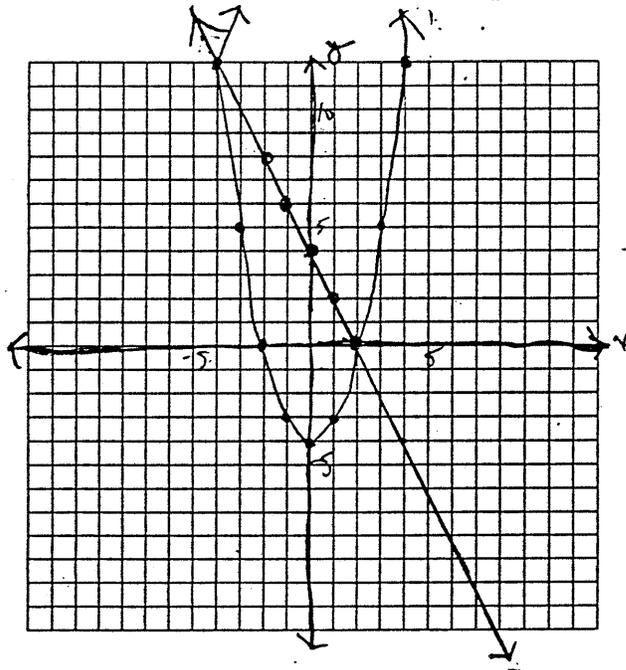
Points of intersection are $(2, 0)$ and $(-4, 12)$

SCORE POINT: 4

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.

$$y = -2x + 4$$

x	y
-2	8
-1	6
0	4
1	2
2	0



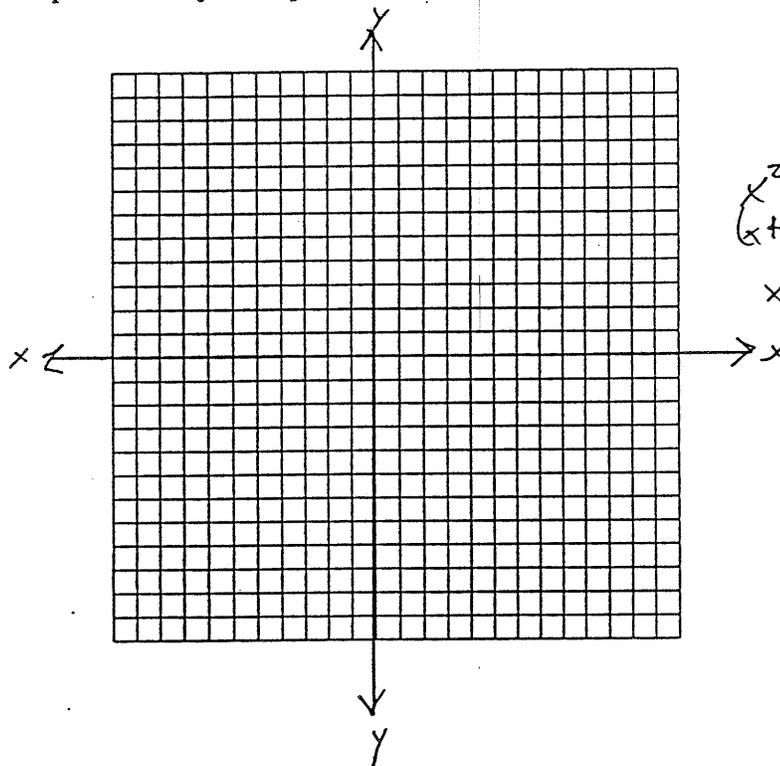
$$y = x^2 - 4$$

x	y	x	y
1	-3	-4	12
2	0	-3	5
3	5	-2	0
4	12	-1	-3

intersection \bullet : $(-4, 12)$
 $(2, 0)$

SCORE POINT: 4

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



$$x^2 - 4 = -2x + 4$$

$$x^2 + 2x - 8 = 0$$

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

$$x = -4 \text{ or } 2$$

$$y = -2(-4) + 4$$

$$y = 8 + 4$$

$$y = 12 \quad (-4, 12)$$

$$y = x^2 - 4$$

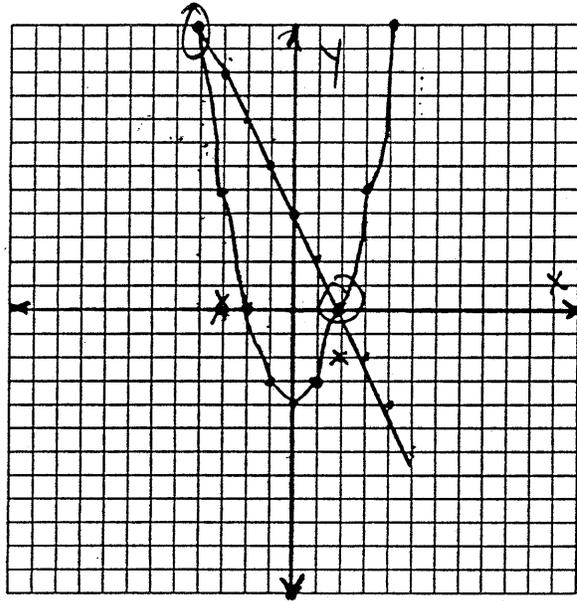
$$(-2)^2 - 4$$

$$y = 4 - 4$$

$$y = 0 \quad (-2, 0)$$

SCORE POINT: 3

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



POINTS OF INTERSECTION
 $(4, 12)$
 $(0, 2)$

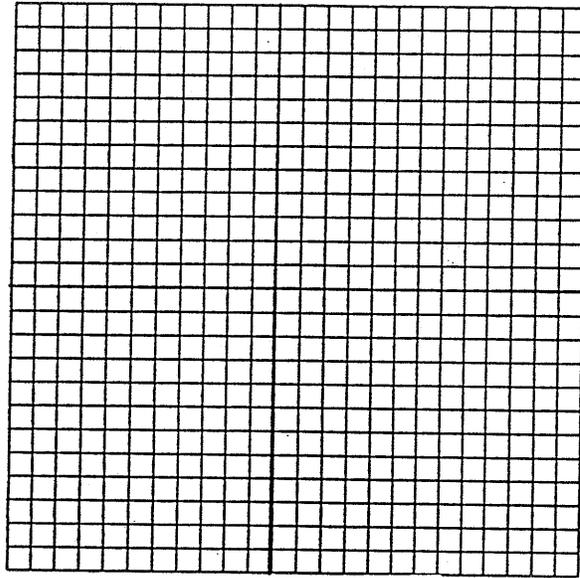
$$\begin{array}{r} 5 \\ 4 \\ 3 \\ 2 \\ 1 \\ 0 \\ -1 \\ -2 \end{array} \quad \begin{array}{r} 21 \\ 12 \\ 5 \\ 0 \\ -3 \\ -4 \\ -3 \\ 0 \end{array}$$

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

$$\frac{4}{2}$$

SCORE POINT:3

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



$$y = -2x + 4$$

$$y = x^2 - 4$$

$$y = -2x + 4$$

$$-y = -x^2 + 4$$

$$0 = -x^2 + 2x + 8 \quad \times (-1)$$

$$x^2 - 2x - 8 = 0$$

$$x = \frac{2 \pm \sqrt{2^2 - 4(-8)(1)}}{2}$$

$$x = \frac{2 \pm \sqrt{4 + 32}}{2}$$

$$x = \frac{2 \pm \sqrt{36}}{2}$$

$$x = \frac{2 \pm 6}{2}$$

$$x = \frac{8}{2} = 4 \quad \text{or} \quad \frac{-4}{2} = -2$$

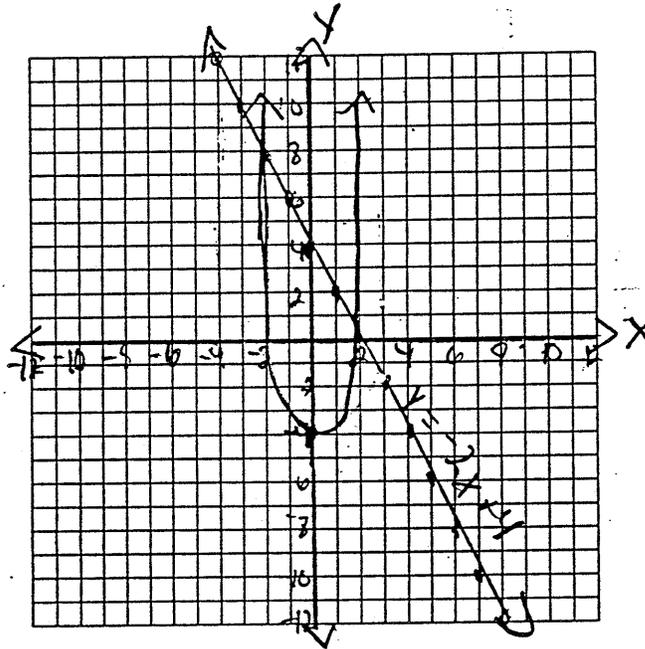
$$y = -2x + 4$$

$$y = -2(4) + 4 = -4 \quad y = -2(-2) + 4 = 6$$

$(4, -4)$ and $(-2, 6)$

SCORE POINT: 2

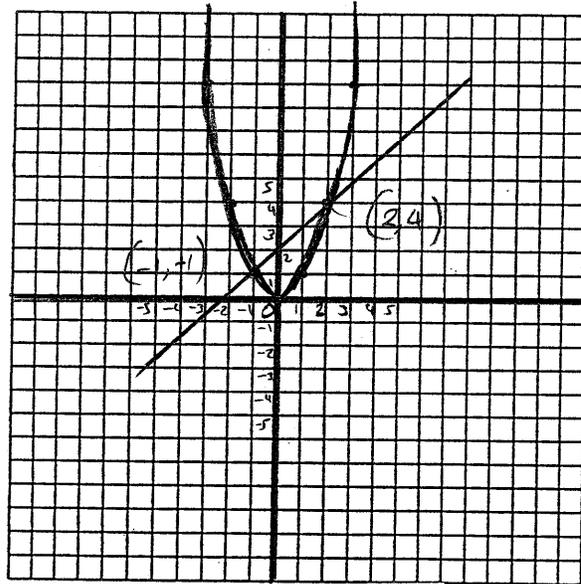
Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



$(1, 5)$
 $(2, 0)$
 $(-2, 8)$

SCORE POINT: 2

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



x	x ²
1	1
-1	1
2	4
-2	4
3	9
-3	9

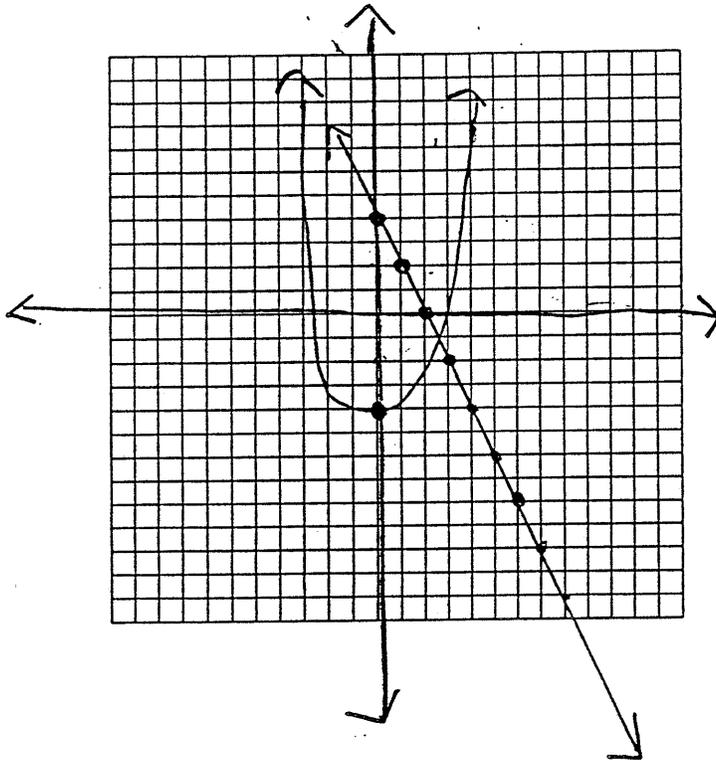
(2, 4)

(2, 4)

(-1, -1)

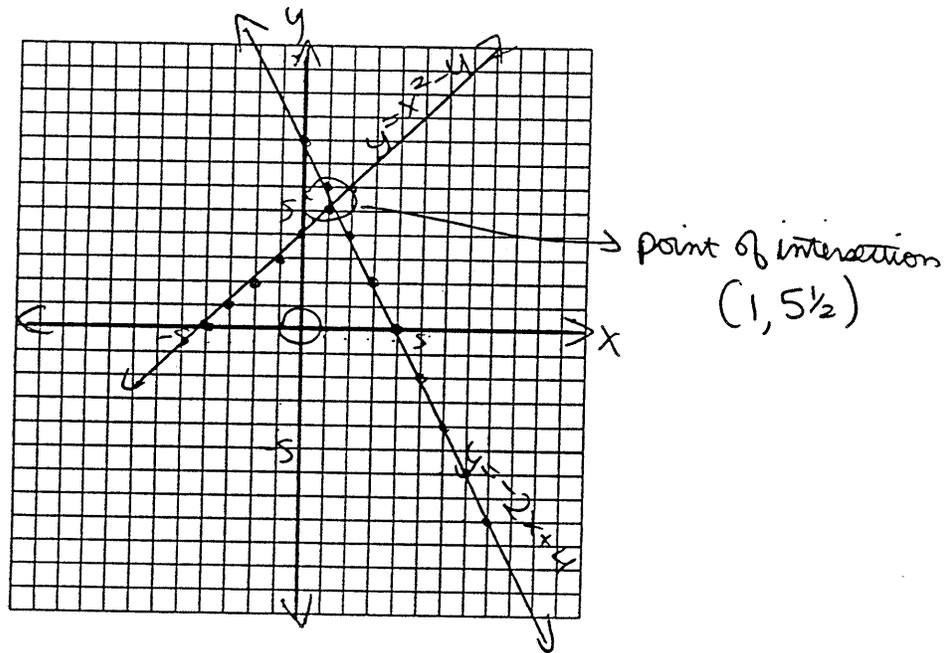
SCORE POINT: 1

Find the points of intersection of the line represented by the equation $y = -\frac{2x}{1} + 4$ and the parabola represented by the equation $y = x^2 - 4$.



SCORE POINT: 1

Find the points of intersection of the line represented by the equation $y = -2x + 4$ and the parabola represented by the equation $y = x^2 - 4$.



Score Point: 0