

The University of the State of New York  
REGENTS HIGH SCHOOL EXAMINATION

# ALGEBRA I

Wednesday, June 19, 2019 — 1:15 to 4:15 p.m.

## MODEL RESPONSE SET

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Question 25

25 Solve algebraically for  $x$ :

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}x - 8 + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-8 = -\frac{5}{4}x + 2$$

$$\frac{-10}{-1.25} = \frac{-1.25x}{-1.25}$$

$$8 = x$$

**Score 2:** The student gave a complete and correct response.

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**Question 25**

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**25** Solve algebraically for  $x$ :

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}x - 8 + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-10 = -\frac{5}{4}x$$

$$\boxed{x = 8}$$

**Score 2:** The student gave a complete and correct response.

Question 25

25 Solve algebraically for  $x$ :

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$\frac{-2}{3}x - 8 + \frac{2}{3}x$$

$$-8 = -\frac{5}{4}x + 2$$
$$-2 \quad -2$$

$$-10 = -\frac{5}{4}x$$

$$\frac{-5}{4} \quad \frac{-5}{4}$$

$$x = \frac{1}{2}$$

**Score 1:** The student made a computational error when dividing by  $-\frac{5}{4}$ .

Question 25

25 Solve algebraically for  $x$ :

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\cancel{\frac{2}{3}}x - 8 + \cancel{\frac{2}{3}}x = -\frac{5}{4}x + 2$$

$$x - 8 = -\frac{5}{4}x + 2$$
$$\left(\frac{4}{4}\right)\frac{9}{4}x = 10\left(\frac{4}{4}\right)$$

$$x = 4.\overline{4}$$

**Score 1:** The student made an error when combining  $-\frac{2}{3}x$  and  $\frac{2}{3}x$ .

**Question 25**

25 Solve algebraically for  $x$ :

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}x + 12 + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$12 = -\frac{5}{4}x + 2$$

$$10 = -\frac{5}{4}x$$

$$x = -\frac{40}{5}$$

**Score 0:** The student did not distribute  $-\frac{2}{3}$  to both terms and wrote an incorrect denominator.

Question 25

25 Solve algebraically for x:

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}(x+12) + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}x - 8 + \frac{2}{3}x = -\frac{5}{4}x + 2$$

$$-\frac{2}{3}x - 10 + \frac{2}{3}x = -\frac{5}{4}x$$

$$0 - 10 = -\frac{5}{4}x$$

$$\left(\frac{4}{5}\right)(0) = -\frac{5}{4}x$$

$$12.5 = x$$

**Score 0:** The student made a computational error simplifying  $0 - 10$  and did not multiply by the reciprocal of  $-\frac{5}{4}$ .

Question 26

26 If  $C = G - 3F$ , find the trinomial that represents  $C$  when  $F = 2x^2 + 6x - 5$  and  $G = 3x^2 + 4$ .

$$-3(2x^2 + 6x - 5)$$

$$-6x^2 - 18x + 15$$

$$3x^2 + 4 - 6x^2 - 18x + 15$$

$$-3x^2 - 18x + 19$$

negative - eighteen + nineteen  
✓ three x  
x squared

**Score 2:** The student gave a complete and correct response.



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**Question 26**

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26 If  $C = G - 3F$ , find the trinomial that represents  $C$  when  $F = 2x^2 + 6x - 5$  and  $G = 3x^2 + 4$ .

$$\begin{aligned} & 3x^2 + 4 - 3(2x^2 + 6x - 5) \\ & 3x^2 + 4 - 6x^2 - 18x + 15 \\ & 19 - 18x - 3x^2 \end{aligned}$$

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**Score 2:** The student gave a complete and correct response.

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**Question 26**

---

26 If  $C = G - 3F$ , find the trinomial that represents  $C$  when  $F = 2x^2 + 6x - 5$  and  $G = 3x^2 + 4$ .

$$\begin{aligned} & 3x^2 + 4 - 3(2x^2 + 6x - 5) \\ & 3x^2 + 4 - 6x^2 - 18x + 15 \\ & -3x^2 - 18 + 19 \end{aligned}$$

**Score 1:** The student wrote  $-18$  instead of  $-18x$ .

Question 26

26 If  $C = G - 3F$ , find the trinomial that represents  $C$  when  $F = 2x^2 + 6x - 5$  and  $G = 3x^2 + 4$ .

$$\begin{aligned}C &= (3x^2 + 4) - 3(2x^2 + 6x - 5) \\C &= (3x^2 + 4) - (6x^2 + 18x - 15) \\C &= -3x^2 + 18x - 11\end{aligned}$$

**Score 1:** The student only negated the  $6x^2$  when subtracting the trinomial.

Question 26

26 If  $C = G - 3F$ , find the trinomial that represents  $C$  when  $F = 2x^2 + 6x - 5$  and  $G = 3x^2 + 4$ .

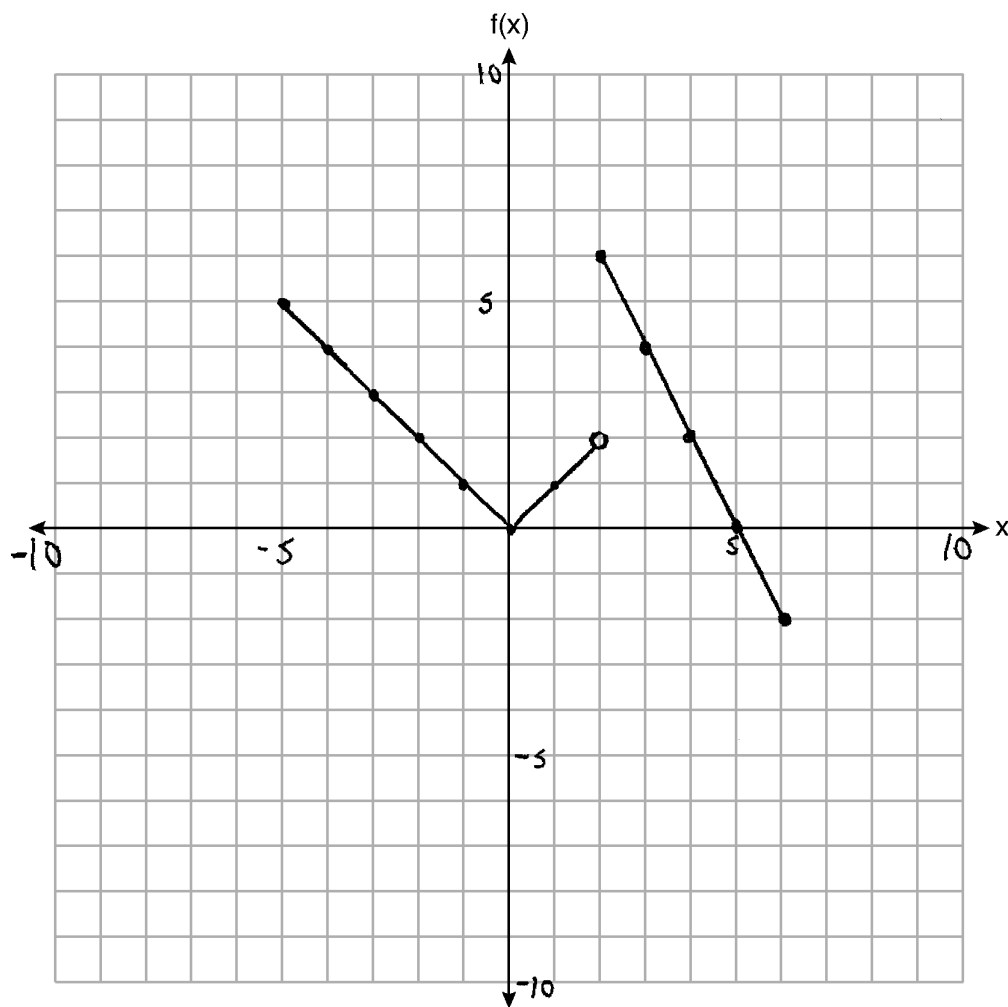
$$\begin{array}{r} 3(2x^2 + 6x - 5) = 6x^2 + 18x - 15 \\ - \quad 3x^2 \qquad \qquad + 4 \\ \hline 3x^2 + 18x - 11 \end{array}$$

**Score 0:** The student did not subtract in the correct order and made an error when subtracting.

Question 27

27 Graph the following piecewise function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -5 \leq x < 2 \\ -2x + 10, & 2 \leq x \leq 6 \end{cases}$$

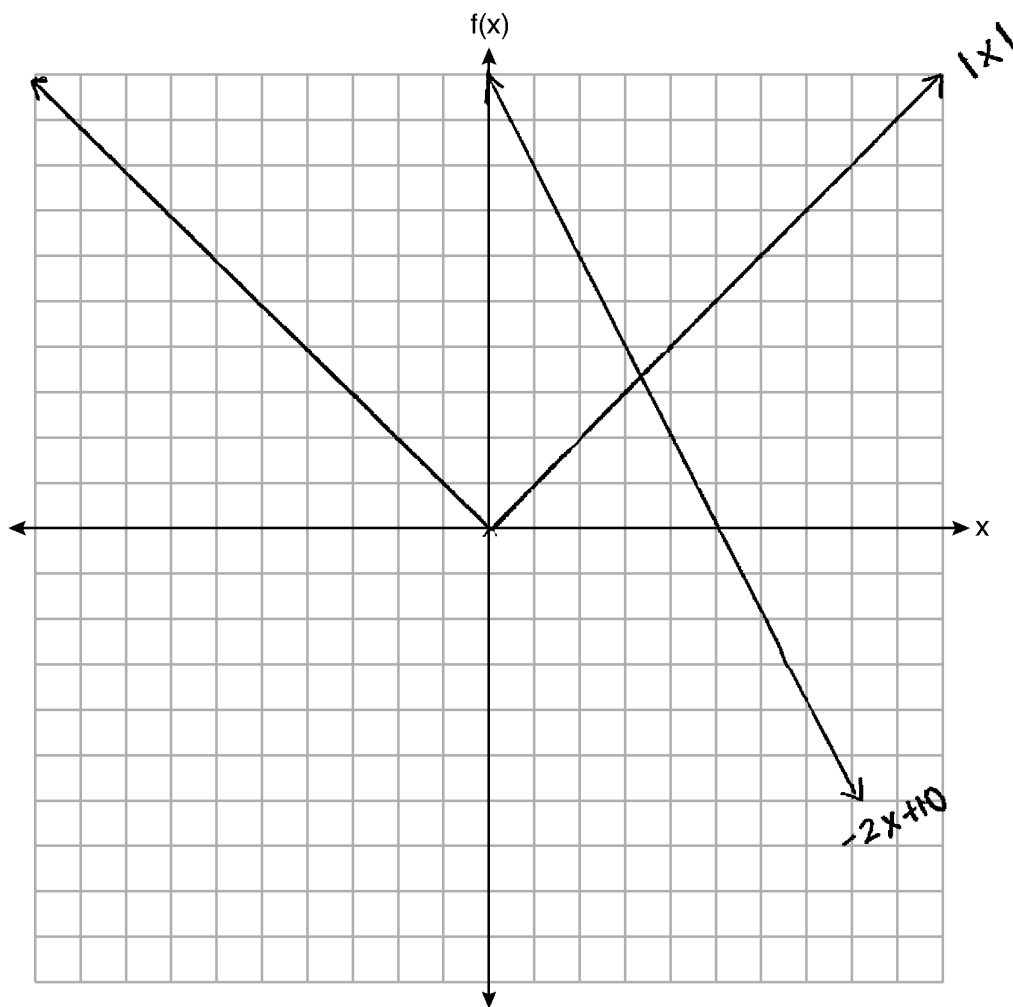


**Score 2:** The student gave a complete and correct response.

Question 27

27 Graph the following piecewise function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -5 \leq x < 2 \\ -2x + 10, & 2 \leq x \leq 6 \end{cases}$$

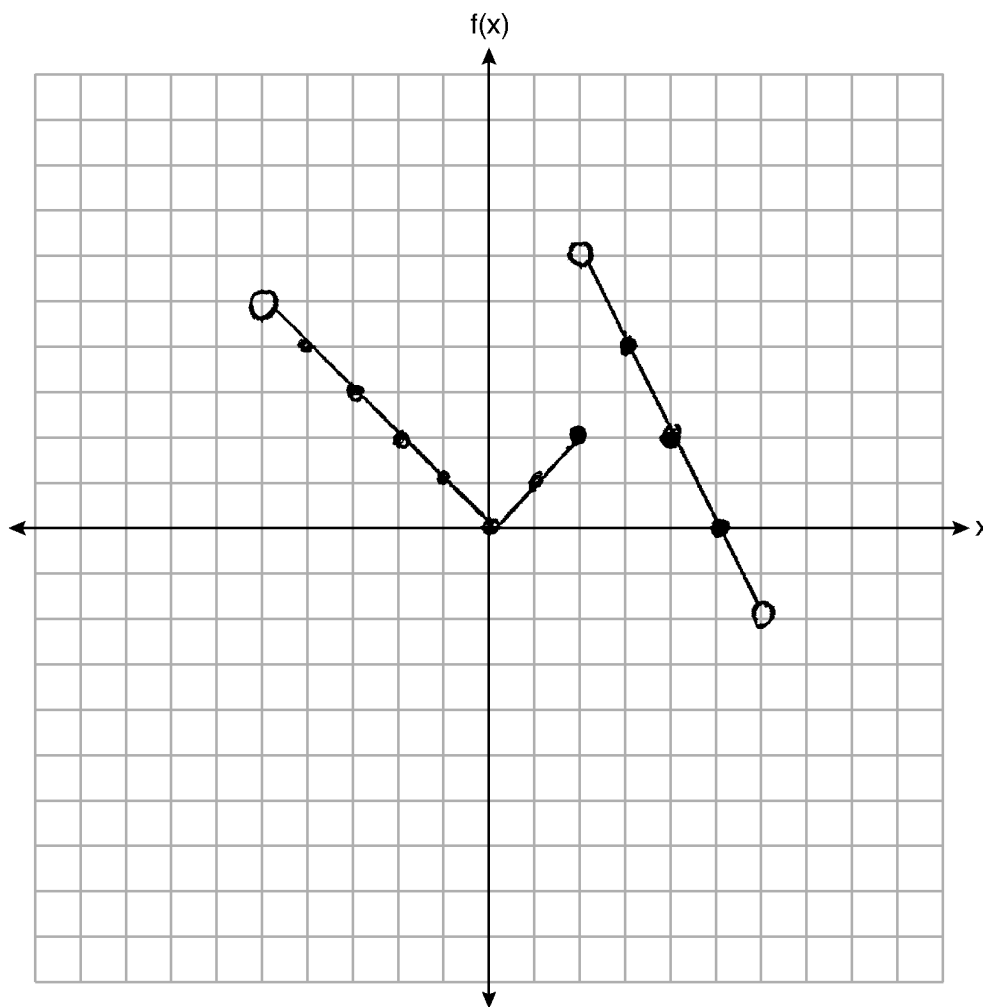


**Score 1:** The student graphed both functions appropriately, but disregarded the domain restrictions.

**Question 27**

**27** Graph the following piecewise function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -5 \leq x < 2 \\ -2x + 10, & 2 \leq x \leq 6 \end{cases}$$

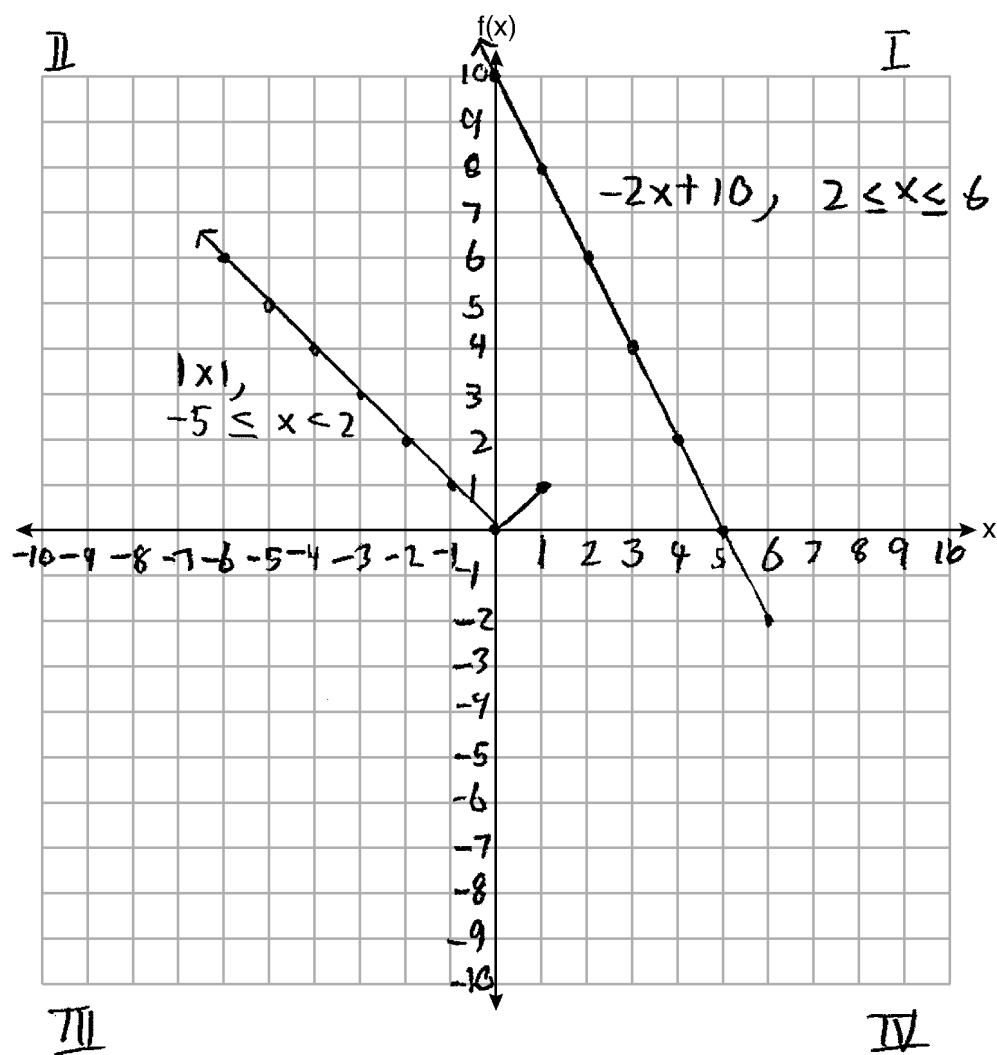


**Score 1:** The student graphed the endpoints of both functions incorrectly.

Question 27

27 Graph the following piecewise function on the set of axes below.

$$f(x) = \begin{cases} |x|, & -5 \leq x < 2 \\ -2x + 10, & 2 \leq x \leq 6 \end{cases}$$



Score 0: The student made multiple graphing errors.



Question 28

28 Solve  $5x^2 = 180$  algebraically.

$$x^2 = 36$$

$$x = \pm 6$$

$$x = +6, -6$$

**Score 2:** The student gave a complete and correct response.

**Question 28**

**28** Solve  $5x^2 = 180$  algebraically.

$$5x^2 - 180 = 0$$

$$x = \frac{0 \pm \sqrt{0 - 4(5)(-180)}}{2(5)}$$

$$x = \frac{\pm \sqrt{3600}}{10}$$

**Score 2:** The student gave a complete and correct response.

Question 28

28 Solve  $5x^2 = 180$  algebraically.

~~$5x^2 = 180$~~   
 ~~$x^2 = \frac{180}{5}$~~   
 ~~$25 = \frac{180}{x}$~~

$$\frac{5x^2 = 180}{5} \quad \frac{180}{5}$$
$$\sqrt{x^2} = \sqrt{\frac{180}{5}}$$
$$x = \sqrt{\frac{180}{5}}$$
$$x = \sqrt{36}$$

**Score 1:** The student only found the positive value of  $x$ .

**Question 28**

28 Solve  $5x^2 = 180$  algebraically.

$$5x^2 - 180 = 0$$

$$a = 5$$

$$b = 0$$

$$c = -180$$

$$x = \frac{0 \pm \sqrt{0^2 - 4(5)(-180)}}{2(5)}$$

$$x = \frac{0 \pm \sqrt{360}}{10}$$

**Score 1:** The student substituted into the quadratic formula correctly, but no further correct work was shown.

Question 28

28 Solve  $5x^2 = 180$  algebraically.

$$\frac{\cancel{5}x^2}{\cancel{5}} = \frac{108}{5}$$

$$\sqrt{x^2} = \sqrt{36}$$

$$(x+6)^2 \text{ or } (x+6)(x+6)$$

**Score 0:** The student did not show enough correct work to receive any credit.

Question 29

29 A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greatest rate of snowfall, in inches per hour? Justify your answer.

1:00 12:00 6:00 15:00

1:00 - 12:00 (1am-12noon)

(1, 1)  
(12, 33)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{33 - 1}{12 - 1}$$

$$m = \frac{32}{11}$$

$m = 2.90 \text{ in/hr}$

6:00 - 15:00 (6am-3pm)

(6, 11)  
(15, 36)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{36 - 11}{15 - 6}$$

$$m = \frac{25}{9}$$

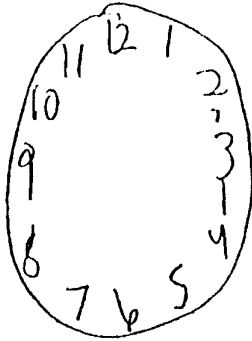
$m = 2.7 \text{ in/hr}$

from 1am - 12 noon

Score 2: The student gave a complete and correct response.

**Question 29**

29 A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.



Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

4  
6  
22  
3

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greatest rate of snowfall, in inches per hour? Justify your answer.

$2.90$   $2.77777778$

from 1am to 12 noon had the greater snowfall rate per hour

**Score 2:** The student gave a complete and correct response.

**Question 29**

29 A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greatest rate of snowfall, in inches per hour? Justify your answer.

1 AM - noon

$$\frac{33-1}{12-1} = \frac{32}{11}$$

6 AM - 3 PM

$$\frac{36-11}{15-6} = \frac{25}{9}$$

$$\frac{32}{11} \quad \frac{25}{9}$$

$$288 > 275$$

**Score 2:** The student gave a complete and correct response.



**Question 29**

29 A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greatest rate of snowfall, in inches per hour? Justify your answer.

$$\frac{33}{11} = 3 \text{ inches per hour}$$

$$\frac{36}{9} = 4 \text{ inches per hour}$$

From 6am to 3pm, there was the greater snowfall rate.

**Score 1:** The student used the accumulated amount of snow in determining the rate of snowfall during both intervals.

**Question 29**

**29** A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

Handwritten annotations: A bracket on the left side of the table spans from 1 a.m. to 12 noon, labeled "11 hours". Another bracket on the left side spans from 6 a.m. to 3 p.m., labeled "9 hours". A bracket on the right side spans from 3 a.m. to 12 noon, labeled "32 in". Another bracket on the right side spans from 6 a.m. to 3 p.m., labeled "25 in".

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greatest rate of snowfall, in inches per hour? Justify your answer.

$$\frac{32}{11} \approx 2.9$$

$$\frac{25}{9} \approx 2.8$$

**Score 1:** The student showed a correct justification, but did not indicate an interval.

**Question 29**

**29** A blizzard occurred on the East Coast during January, 2016. Snowfall totals from the storm were recorded for Washington, D.C. and are shown in the table below.

Washington, D.C.	
Time	Snow (inches)
1 a.m.	1
3 a.m.	5
6 a.m.	11
12 noon	33
3 p.m.	36

*Handwritten annotations:* A bracket on the right side of the table groups the rows from 1 a.m. to 3 a.m. with the number 4. Another bracket groups the rows from 3 a.m. to 6 a.m. with the number 6. A third bracket groups the rows from 6 a.m. to 12 noon with the number 22. A final bracket groups the rows from 12 noon to 3 p.m. with the number 3.

Which interval, 1 a.m. to 12 noon or 6 a.m. to 3 p.m., has the greatest rate of snowfall, in inches per hour? Justify your answer.

*1 am to 12 noon*

**Score 0:** The student did not give a justification.

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**Question 30**

---

**30** The formula for the volume of a cone is  $V = \frac{1}{3}\pi r^2 h$ . Solve the equation for  $h$  in terms of  $V$ ,  $r$ , and  $\pi$ .

$$\frac{3V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$$

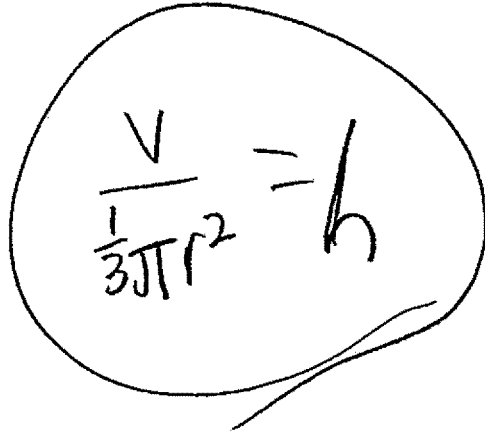
$$\frac{3V}{\pi r^2} = h$$

**Score 2:** The student gave a complete and correct response.

Question 30

30 The formula for the volume of a cone is  $V = \frac{1}{3}\pi r^2 h$ . Solve the equation for  $h$  in terms of  $V$ ,  $r$ , and  $\pi$ .

~~$\frac{1}{3}\pi r^2$~~   ~~$\frac{1}{3}\pi r^2$~~



A handwritten equation  $\frac{V}{\frac{1}{3}\pi r^2} = h$  is enclosed in a hand-drawn circle. The circle is drawn with a single continuous line, and there is a double-line flourish at the bottom right of the circle.

**Score 2:** The student gave a complete and correct response.

Question 30

30 The formula for the volume of a cone is  $V = \frac{1}{3}\pi r^2 h$ . Solve the equation for  $h$  in terms of  $V$ ,  $r$ , and  $\pi$ .

$$V = \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi h}$$
$$\sqrt{\frac{V}{\frac{1}{3}\pi h}} = \sqrt{r^2}$$

$$\sqrt{\frac{V}{\frac{1}{3}\pi h}} = r$$

$$\boxed{\sqrt{\frac{V}{\frac{1}{3}\pi h}} = r}$$

**Score 1:** The student showed appropriate work to solve the formula for  $r$ .

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**Question 30**

---

**30** The formula for the volume of a cone is  $V = \frac{1}{3}\pi r^2 h$ . Solve the equation for  $h$  in terms of  $V$ ,  $r$ , and  $\pi$ .

$$(3)V = \frac{1}{3}\pi r^2 h \quad (3)$$

$$\frac{3V}{\pi} = \frac{\pi r^2 h}{\pi}$$

$$\sqrt{\frac{3V}{\pi}} = \sqrt{r^2 h}$$

$$\sqrt{\frac{3V}{\pi}} = h$$

**Score 0:** The student made multiple errors involving the radical.

Question 31

31 Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of  $a_2$ ,  $a_3$ , and  $a_4$  for the given recursive formula.

$$a_n = 2(a_{n-1} + 1)$$

$$a_2 = 2(3 + 1)$$

$$a_2 = 2(4)$$

$$a_2 = 8$$

$$a_n = 2(a_{n-1} + 1)$$

$$a_3 = 2(8 + 1)$$

$$a_3 = 2(9)$$

$$a_3 = 18$$

$$a_n = 2(a_{n-1} + 1)$$

$$a_4 = 2(18 + 1)$$

$$a_4 = 2(19)$$

$$a_4 = 38$$

The 3 next terms in the sequence are 8, 18, 38

Score 2: The student gave a complete and correct response.



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**Question 31**

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**31** Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of  $a_2$ ,  $a_3$ , and  $a_4$  for the given recursive formula.

8, 18, 38

**Score 2:** The student gave a complete and correct response.

**Question 31**

31 Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of  $a_2$ ,  $a_3$ , and  $a_4$  for the given recursive formula.

~~Arithmetic sequence:~~

$$a_2 = 2(3+1)$$

$$a_2 = 8$$

$$a_3 = 2(8+1)$$

$$a_3 = 18$$

$$\{3, 8, 18\}$$

**Score 1:** The student stated the first three values in the sequence.

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**Question 31**

---

**31** Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of  $a_2$ ,  $a_3$ , and  $a_4$  for the given recursive formula.

8 and 18

**Score 1:** The student stated  $a_2$  and  $a_3$  correctly.

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**Question 31**

---

31 Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of  $a_2$ ,  $a_3$ , and  $a_4$  for the given recursive formula.

$$a_1 = 3$$

$$a_2 = 2(3+1) = 7$$

$$a_3 = 2(7+1) = 15$$

$$a_4 = 2(15+1) = 31$$

**Score 1:** The student distributed incorrectly.

**Question 31**

31 Given the recursive formula:

$$a_1 = 3$$

$$a_n = 2(a_{n-1} + 1)$$

State the values of  $a_2$ ,  $a_3$ , and  $a_4$  for the given recursive formula.

$$\begin{array}{l} a_2 = 2(3 - 1 + 1) \\ a_2 = 6 - 1 + 1 \\ a_2 = 6 \end{array} \quad \left| \begin{array}{l} a_3 = 2(6 - 1 + 1) \\ a_3 = 12 - 1 + 1 \\ a_3 = 12 \end{array} \right| \quad \left| \begin{array}{l} a_4 = 2(12 - 1 + 1) \\ a_4 = 24 - 1 + 1 \\ a_4 = 24 \end{array} \right.$$

**Score 0:** The student subtracted 1 from the  $a_{n-1}$  term and distributed incorrectly.

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**Question 32**

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32 Determine and state the vertex of  $f(x) = x^2 - 2x - 8$  using the method of completing the square.

$$\left(\frac{-2}{2}\right)^2 = 1$$
$$f(x) = x^2 - 2x + 1 - 1 - 8$$
$$f(x) = (x - 1)^2 - 9$$
$$\boxed{(1, -9)}$$

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**Score 2:** The student gave a complete and correct response.

Question 32

32 Determine and state the vertex of  $f(x) = x^2 - 2x - 8$  using the method of completing the square.

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

$$+8$$

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

$$C = \left(\frac{b}{2}\right)^2$$

$$C = \left(\frac{-2}{2}\right)^2$$

$$C = 1$$

$$x^2 - 2x + 1 = 9$$

$$(x-1)^2 = 9$$

$$x-1 = \pm 3$$

$$x = 1 + 3$$

or

$$x = 1 - 3$$

$$x = 4$$

$$x = -2$$

**Score 1:** The student used the method of completing the square to determine the zeros of  $f(x)$ .

Question 32

32 Determine and state the vertex of  $f(x) = x^2 - 2x - 8$  using the method of completing the square.

$$f(x) = (x^2 - 2x + 1) - 1 - 8$$

$$f(x) = (x - 1)^2 - 9$$

$$f(x) = \{1, -9\}$$

$$f(x) = \{1, -9\}$$

**Score 1:** The student showed correct work to find  $f(x) = (x - 1)^2 - 9$ , but the vertex is stated incorrectly.



Question 32

32 Determine and state the vertex of  $f(x) = x^2 - 2x - 8$  using the method of completing the square.

x	f(x)
-1	-5
0	-8
1	-9
2	-8
3	-8

(1, -9)

**Score 1:** The student found the correct vertex, but used a method other than completing the square.

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**Question 32**

---

32 Determine and state the vertex of  $f(x) = x^2 - 2x - 8$  using the method of completing the square.

$$f(x) = x^2 - 2x - 8$$

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

$$\begin{array}{r} x+2=0 \text{ or } x-4=0 \\ -2 \quad -2 \qquad \quad +4 \quad +4 \\ \hline x=-2 \qquad \qquad \quad x=4 \end{array}$$

Roots

$\{-2, 4\}$

**Score 0:** The student did not use the method of completing the square and did not state the vertex.

**Question 33**

**33** A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company A charges a \$50 set-up fee and \$5 per shirt. Company B charges a \$25 set-up fee and \$6 per shirt.

Write an equation for Company A that could be used to determine the total cost,  $A$ , when  $x$  shirts are ordered. Write a second equation for Company B that could be used to determine the total cost,  $B$ , when  $x$  shirts are ordered.

$$A = 5x + 50$$

$$B = 6x + 25$$

Determine algebraically and state the minimum number of shirts that must be ordered for it to be cheaper to use Company A.

$$\begin{array}{r} 5x + 50 = 6x + 25 \\ -5x \qquad -5x \end{array}$$

$$\begin{array}{r} 50 = x + 25 \\ -25 \qquad -25 \end{array}$$

$$5(25) + 50 = 175$$

$$6(25) + 25 = 175$$

$$x = 25$$

Minimum  
of 26  
shirts

**Score 4:** The student gave a complete and correct response.

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**Question 33**

---

- 33** A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company *A* charges a \$50 set-up fee and \$5 per shirt. Company *B* charges a \$25 set-up fee and \$6 per shirt.

Write an equation for Company *A* that could be used to determine the total cost, *A*, when *x* shirts are ordered. Write a second equation for Company *B* that could be used to determine the total cost, *B*, when *x* shirts are ordered.

$$A = 50 + 5x$$

$$B = 25 + 6x$$

Determine algebraically and state the *minimum* number of shirts that must be ordered for it to be cheaper to use Company *A*.

$$50 + 5x < 25 + 6x$$

$$25 < x$$

$$x = 26$$

**Score 4:** The student gave a complete and correct response.

**Question 33**

**33** A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company A charges a \$50 set-up fee and \$5 per shirt. Company B charges a \$25 set-up fee and \$6 per shirt.

Write an equation for Company A that could be used to determine the total cost,  $A$ , when  $x$  shirts are ordered. Write a second equation for Company B that could be used to determine the total cost,  $B$ , when  $x$  shirts are ordered.

$$\text{Company A} = 50 + 5x$$

$$\text{Company B} = 25 + 6x$$

Determine algebraically and state the *minimum* number of shirts that must be ordered for it to be cheaper to use Company A.

$$\begin{array}{r} 50 + 5x < 25 + 6x \\ -25 \quad -25 \end{array}$$

$$\begin{array}{r} 25 + 5x < 6x \\ -5x \quad -5x \end{array}$$

$$25 < x$$

The minimum is  
25 shirts

**Score 3:** The student showed correct algebraic work to find  $x > 25$ , but stated an incorrect minimum.

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**Question 33**

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- 33** A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company *A* charges a \$50 set-up fee and \$5 per shirt. Company *B* charges a \$25 set-up fee and \$6 per shirt.

Write an equation for Company *A* that could be used to determine the total cost, *A*, when *x* shirts are ordered. Write a second equation for Company *B* that could be used to determine the total cost, *B*, when *x* shirts are ordered.

$$y = 50 + 5x$$

$$y = 25 + 6x$$

Determine algebraically and state the *minimum* number of shirts that must be ordered for it to be cheaper to use Company *A*.

26 shirts  
Company A = 180  
Company B = 181

**Score 2:** The student wrote two appropriate equations, but not in terms of *A* and *B*, and 26 was stated.

**Question 33**

**33** A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company A charges a \$50 set-up fee and \$5 per shirt. Company B charges a \$25 set-up fee and \$6 per shirt.

Write an equation for Company A that could be used to determine the total cost,  $A$ , when  $x$  shirts are ordered. Write a second equation for Company B that could be used to determine the total cost,  $B$ , when  $x$  shirts are ordered.

$$y = 5x + 50$$
$$y = 6x + 25$$

Determine algebraically and state the *minimum* number of shirts that must be ordered for it to be cheaper to use Company A.

Minimum 10 shirts

$$5(2) + 50 = 60$$

$$5(3) + 50 = 65$$

$$5(4) + 50 = 70$$

$$5(5) + 50 = 75$$

$$5(6) + 50 = 80$$

$$5(7) + 50 = 85$$

$$5(8) + 50 = 90$$

$$5(10) + 50 = 95$$

$$5(10) + 50 = 100$$

**Score 1:** The student wrote two appropriate equations, but not in terms of  $A$  and  $B$ .

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**Question 33**

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- 33** A school plans to have a fundraiser before basketball games selling shirts with their school logo. The school contacted two companies to find out how much it would cost to have the shirts made. Company *A* charges a \$50 set-up fee and \$5 per shirt. Company *B* charges a \$25 set-up fee and \$6 per shirt.

Write an equation for Company *A* that could be used to determine the total cost, *A*, when *x* shirts are ordered. Write a second equation for Company *B* that could be used to determine the total cost, *B*, when *x* shirts are ordered.

$$\begin{aligned} \text{Company A} &= 50f + 5s \\ \text{Company B} &= 25f + 6s \end{aligned}$$

Determine algebraically and state the *minimum* number of shirts that must be ordered for it to be cheaper to use Company *A*.

6 shirts

**Score 0:** The student did not show any correct work.

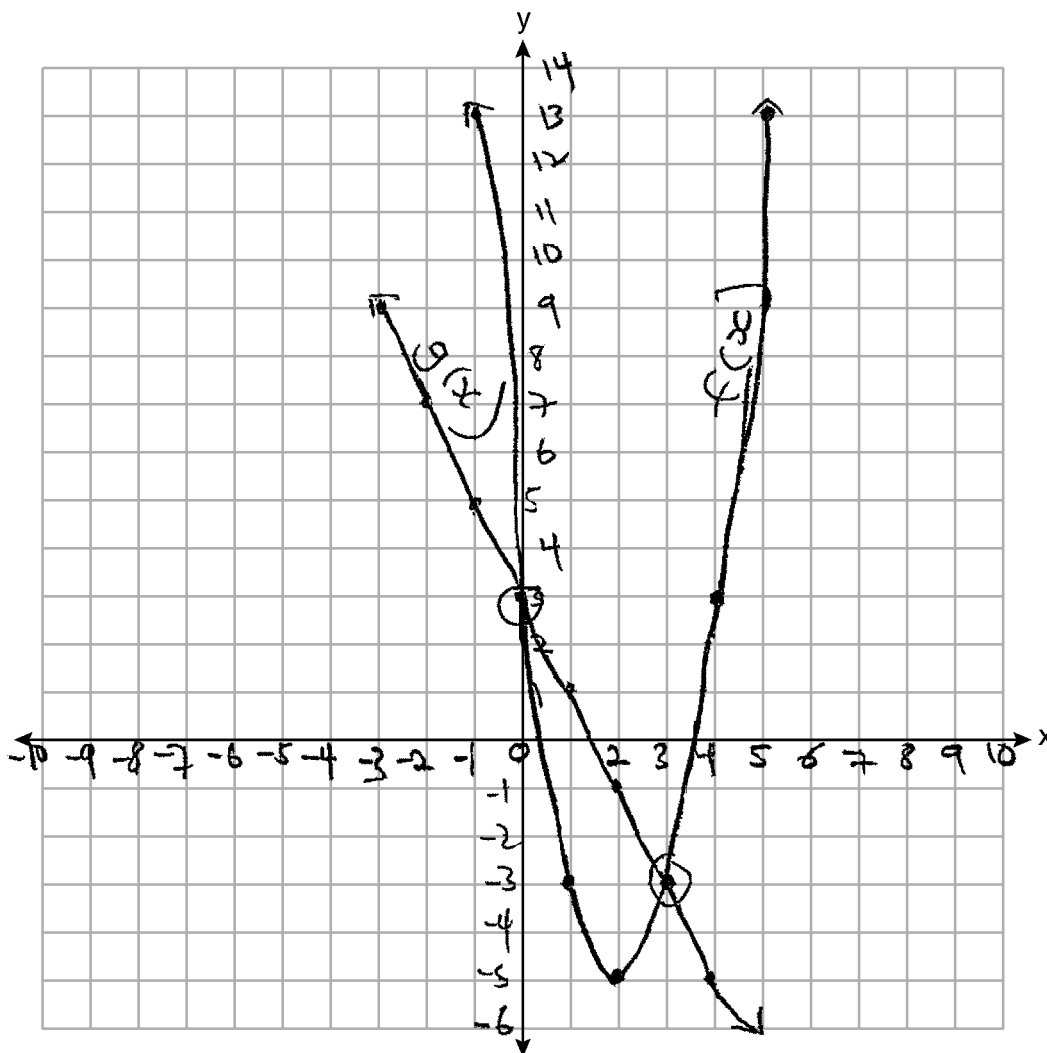


Question 34

34 Graph  $y = f(x)$  and  $y = g(x)$  on the set of axes below.

$$f(x) = 2x^2 - 8x + 3$$

$$g(x) = -2x + 3$$



Determine and state all values of  $x$  for which  $f(x) = g(x)$ .

0, 3

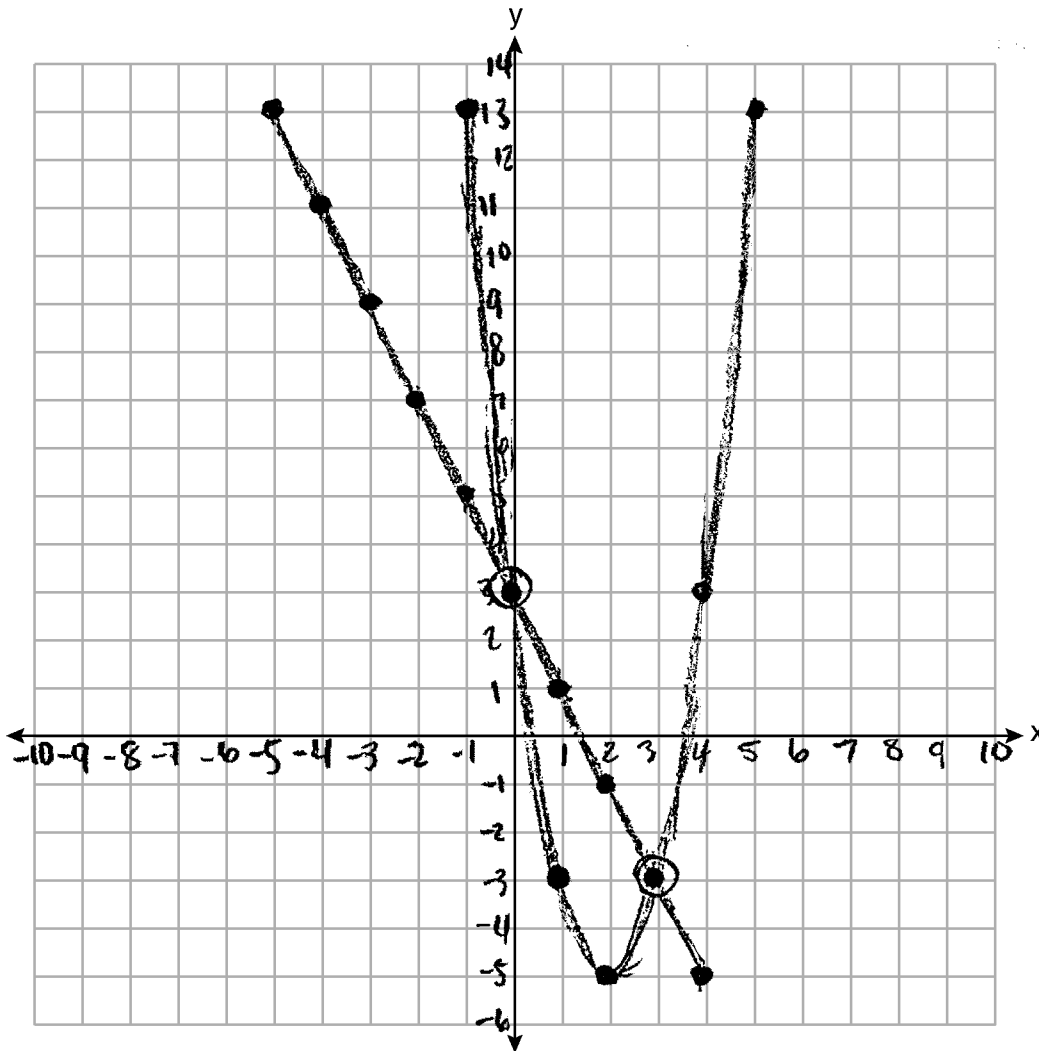
**Score 4:** The student gave a complete and correct response.

Question 34

34 Graph  $y = f(x)$  and  $y = g(x)$  on the set of axes below.

$$f(x) = 2x^2 - 8x + 3$$

$$g(x) = -2x + 3$$



Determine and state all values of  $x$  for which  $f(x) = g(x)$ .

$$f(x) = g(x) \text{ when } x = 0 \text{ and } 3$$

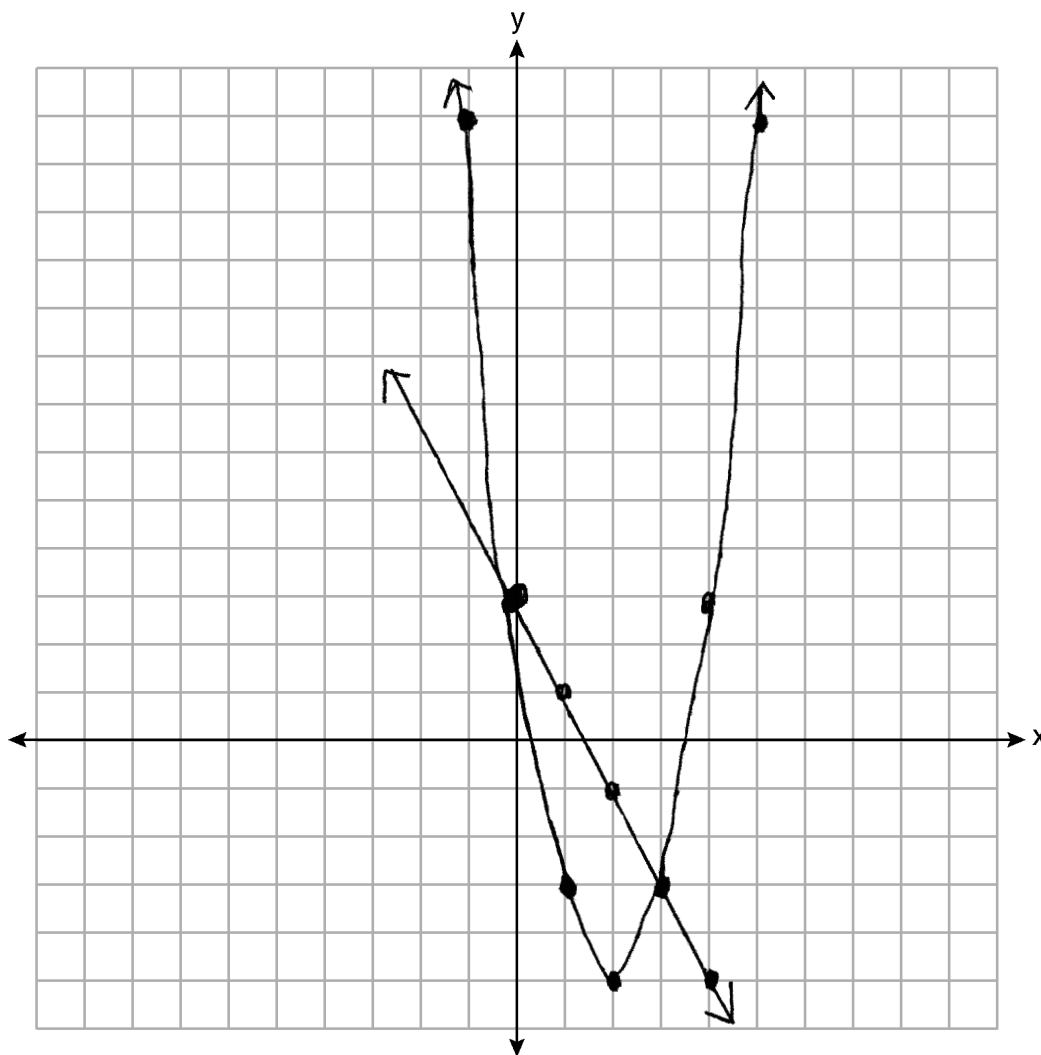
**Score 3:** The student did not use arrows or the entire grid when graphing the functions.

Question 34

34 Graph  $y = f(x)$  and  $y = g(x)$  on the set of axes below.

$$f(x) = 2x^2 - 8x + 3$$

$$g(x) = -2x + 3$$



Determine and state all values of  $x$  for which  $f(x) = g(x)$ .

$(3, 0)$

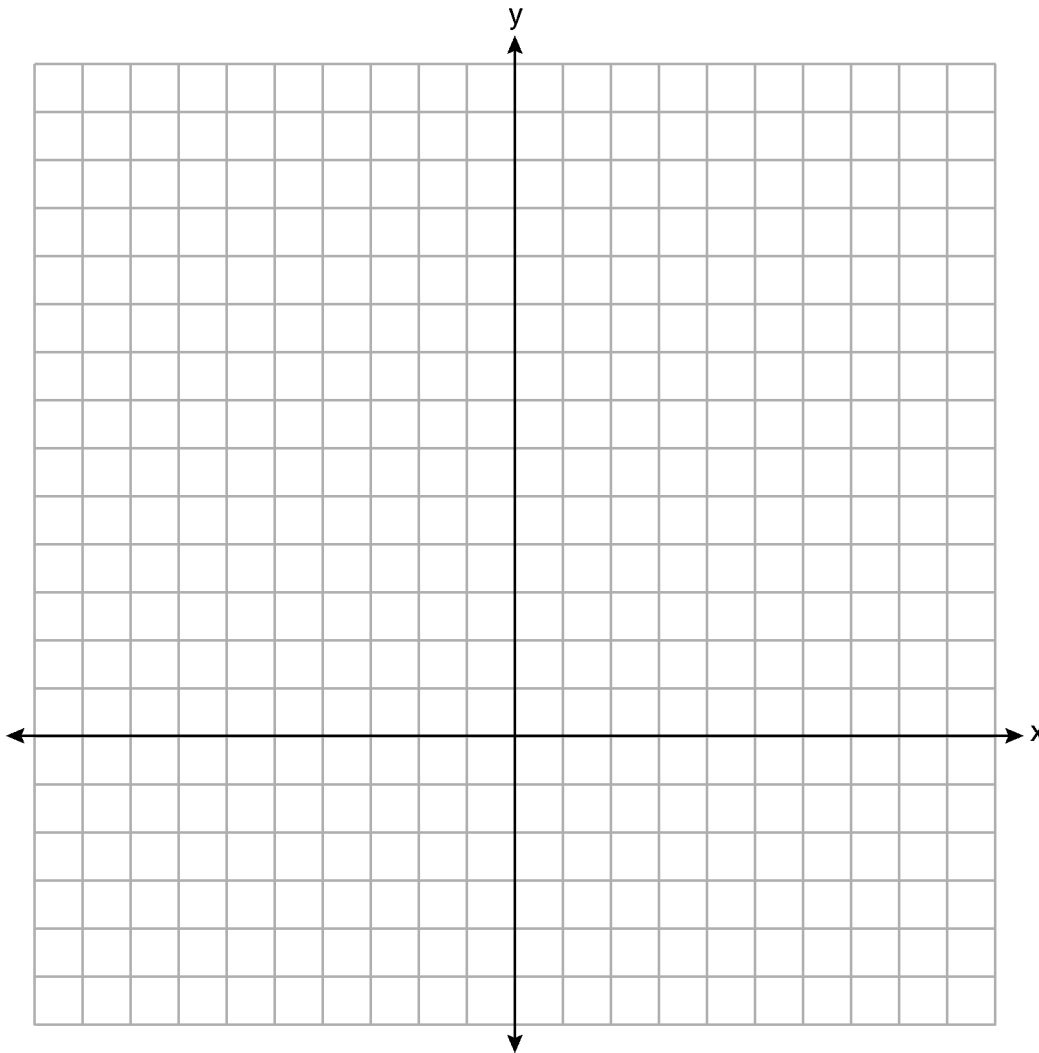
**Score 2:** The student graphed both functions correctly, but no further correct work was shown.

Question 34

34 Graph  $y = f(x)$  and  $y = g(x)$  on the set of axes below.

$$f(x) = 2x^2 - 8x + 3$$

$$g(x) = -2x + 3$$



Determine and state all values of  $x$  for which  $f(x) = g(x)$ .

$$\begin{array}{r} 2x^2 - 8x + 3 = -2x + 3 \\ \underline{+2x - 3 \quad +2x - 3} \\ 2x^2 - 6x = 0 \\ 2x(x - 3) = 0 \\ x = 3 \end{array}$$

**Score 1:** The student showed correct algebraic work to find  $x = 3$ .

Question 34

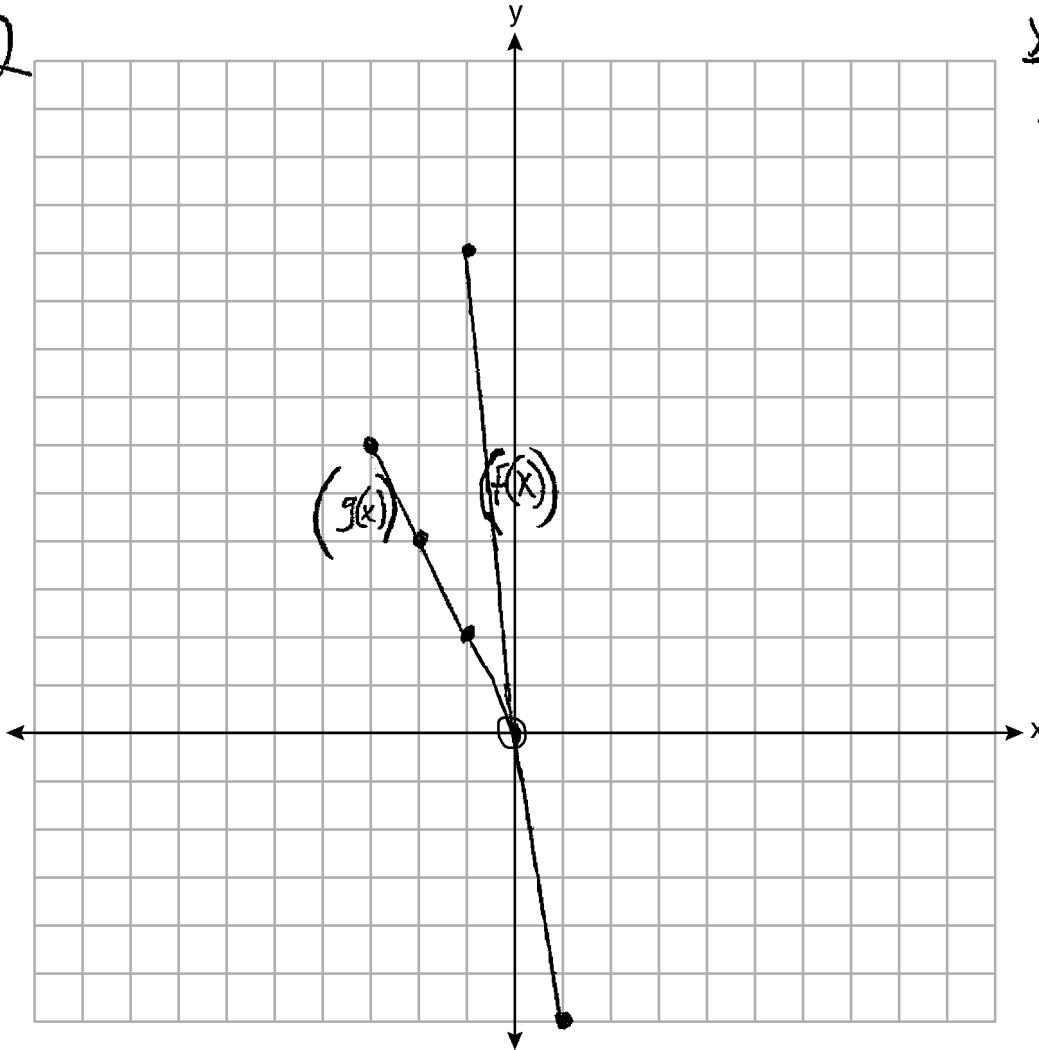
34 Graph  $y = f(x)$  and  $y = g(x)$  on the set of axes below.

$$f(x) = 2x^2 - 8x + 3$$

$$g(x) = -2x + 3$$

x	f(x)
-3	45
-2	27
-1	13
0	3
1	-3
2	-5
3	-3

x	g(x)
-3	-9
-2	-7
-1	-5
0	-3
1	-1
2	1



Determine and state all values of  $x$  for which  $f(x) = g(x)$ .

$(0, 3)$

**Score 0:** The student graphed both functions incorrectly and stated only one point of intersection.

Question 35

35 The table below shows the number of hours ten students spent studying for a test and their scores.

Hours Spent Studying (x)	0	1	2	4	4	4	6	6	7	8
Test Scores (y)	35	40	46	65	67	70	82	88	82	95

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = 7.79x + 34.27$$

State the correlation coefficient of this line, to the *nearest hundredth*.

$$r = 0.98$$

Explain what the correlation coefficient suggests in the context of the problem.

The correlation coefficient suggests that there is a strong correlation between the hours spent studying and test scores.

**Score 4:** The student gave a complete and correct response.

**Question 35**

35 The table below shows the number of hours ten students spent studying for a test and their scores.

<b>Hours Spent Studying (x)</b>	0	1	2	4	4	4	6	6	7	8
<b>Test Scores (y)</b>	35	40	46	65	67	70	82	88	82	95

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = 7.79x + 34.27$$

State the correlation coefficient of this line, to the *nearest hundredth*.

$$r = .9815741571$$

$$r = .98$$

Explain what the correlation coefficient suggests in the context of the problem.

The correlation coefficient suggests that there is a strong positive correlation of the data because it is close to 1.

**Score 3:** The student did not write the explanation in context.

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**Question 35**

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**35** The table below shows the number of hours ten students spent studying for a test and their scores.

<b>Hours Spent Studying (x)</b>	0	1	2	4	4	4	6	6	7	8
<b>Test Scores (y)</b>	35	40	46	65	67	70	82	88	82	95

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = ax + b \qquad a = 7.79$$
$$\qquad \qquad \qquad b = 34.27$$

State the correlation coefficient of this line, to the *nearest hundredth*.

Explain what the correlation coefficient suggests in the context of the problem.

---

**Score 2:** The student wrote a correct linear regression equation.



**Question 35**

35 The table below shows the number of hours ten students spent studying for a test and their scores.

<b>Hours Spent Studying (x)</b>	0	1	2	4	4	4	6	6	7	8
<b>Test Scores (y)</b>	35	40	46	65	67	70	82	88	82	95

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$7.79x + 34.27.$$

State the correlation coefficient of this line, to the *nearest hundredth*.

$$r = .98$$

Explain what the correlation coefficient suggests in the context of the problem.

The closer to one the higher the test scores and hours spent studying.

**Score 2:** The student wrote an expression and did not explain the correlation coefficient correctly.

Question 35

35 The table below shows the number of hours ten students spent studying for a test and their scores.

Hours Spent Studying (x)	0	1	2	4	4	4	6	6	7	8
Test Scores (y)	35	40	46	65	67	70	82	88	82	95

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = ax + b$$
$$y = 7.8x + 34.3$$
$$r = 1$$

State the correlation coefficient of this line, to the *nearest hundredth*.

?  
not sure  
what is

$$r = .98$$
$$r^2 = .96$$

Explain what the correlation coefficient suggests in the context of the problem.

**Score 1:** The student made a rounding error when writing the linear regression equation and did not indicate which value was the correlation coefficient.

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**Question 35**

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**35** The table below shows the number of hours ten students spent studying for a test and their scores.

<b>Hours Spent Studying (x)</b>	0	1	2	4	4	4	6	6	7	8
<b>Test Scores (y)</b>	35	40	46	65	67	70	82	88	82	95

Write the linear regression equation for this data set. Round all values to the *nearest hundredth*.

$$y = .35x + 0$$

State the correlation coefficient of this line, to the *nearest hundredth*.

$$.96$$

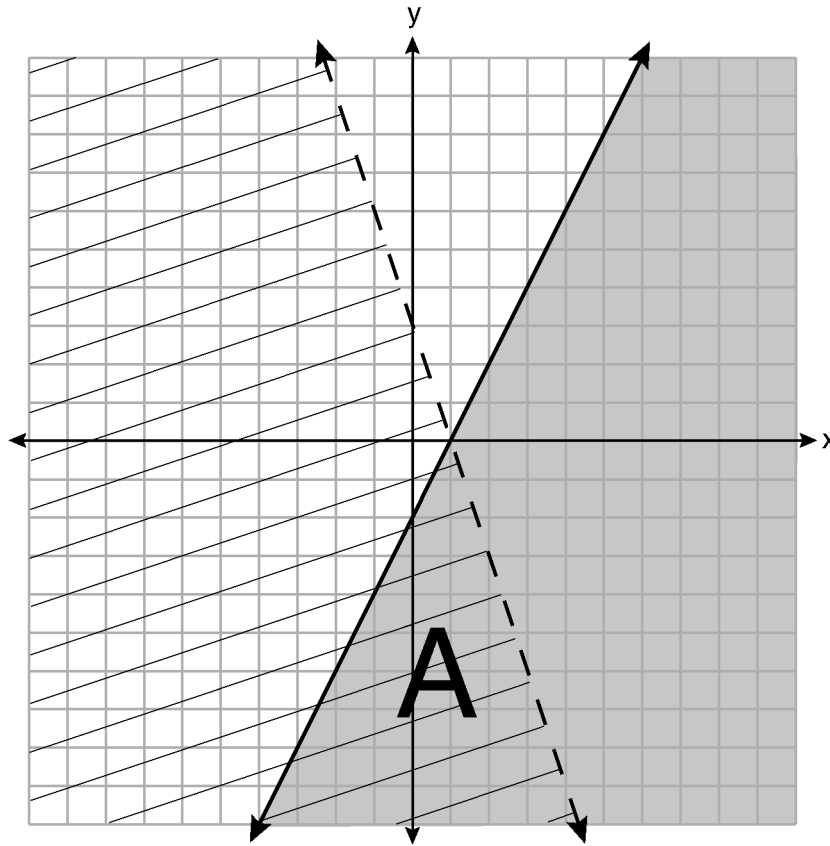
Explain what the correlation coefficient suggests in the context of the problem.

The correlation suggests that there is a positive correlation in time spent studying for test and their grades.

**Score 0:** The student did not indicate “strong” when explaining their correlation coefficient.

Question 36

36 A system of inequalities is graphed on the set of axes below.



State the system of inequalities represented by the graph.

$$y \leq 2x - 2$$
$$y < -3x + 3$$

State what region A represents.

The solution to the system

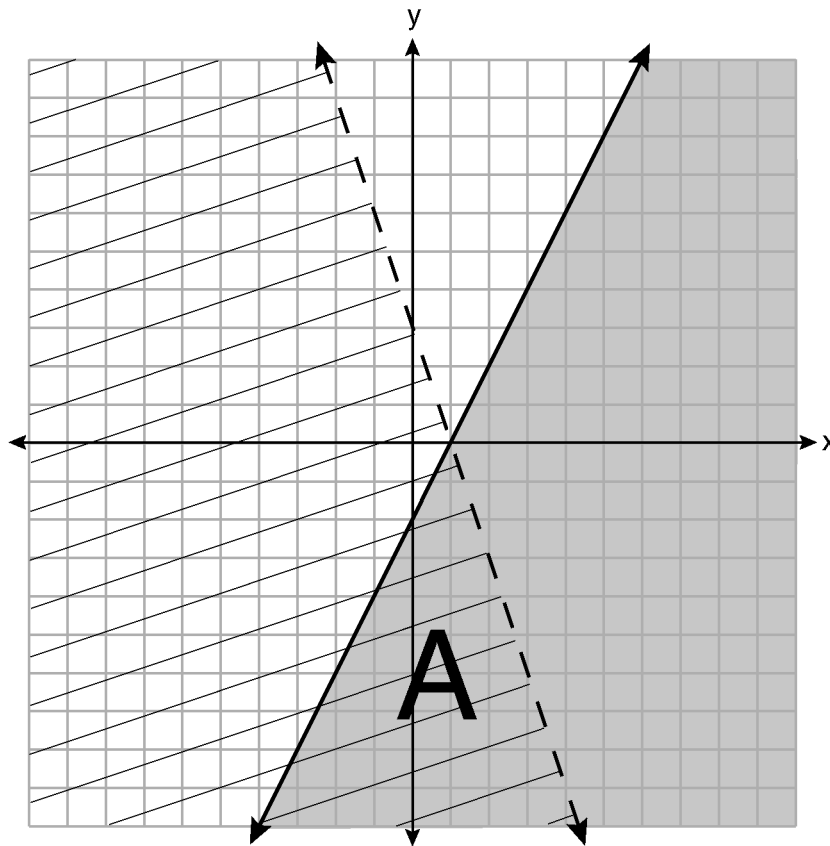
State what the entire gray region represents.

Solution to  $y \leq 2x - 2$  only

Score 4: The student gave a complete and correct response.

**Question 36**

**36** A system of inequalities is graphed on the set of axes below.



State the system of inequalities represented by the graph.

$$y = 2x - 2$$
$$y = -3x + 3$$

State what region A represents.

The solution set for the system

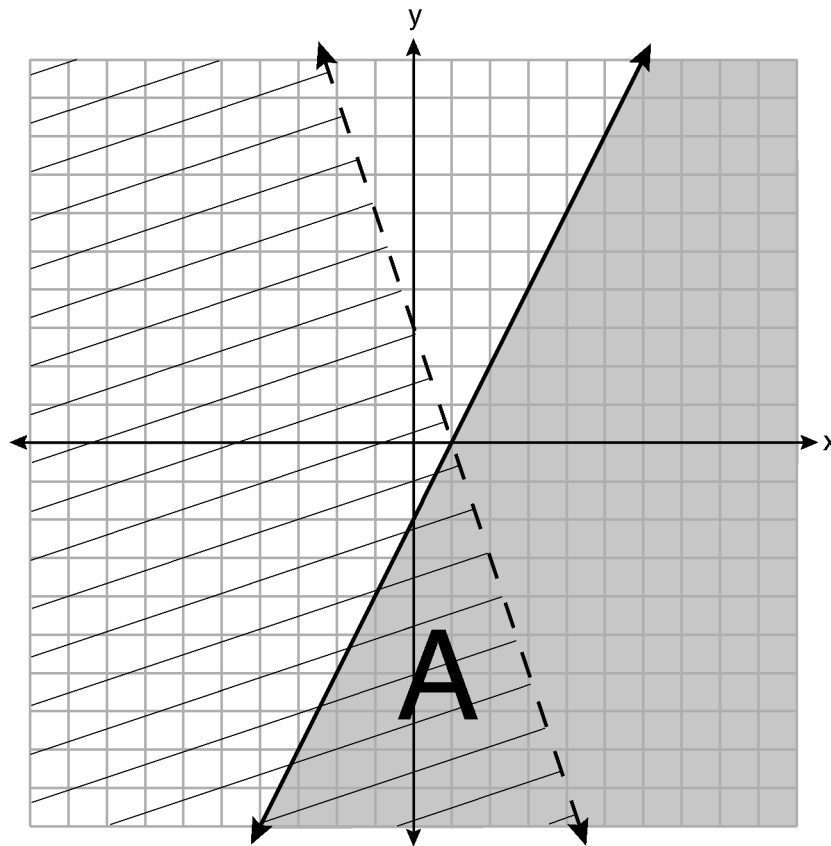
State what the entire gray region represents.

The solution for  $y = 2x - 2$

**Score 3:** The student wrote equations instead of inequalities.

Question 36

36 A system of inequalities is graphed on the set of axes below.



State the system of inequalities represented by the graph.

①  $2x - 2 \leq 1$

②  $x < 1$

State what region A represents.

Region A represents the solution set shared by both inequalities

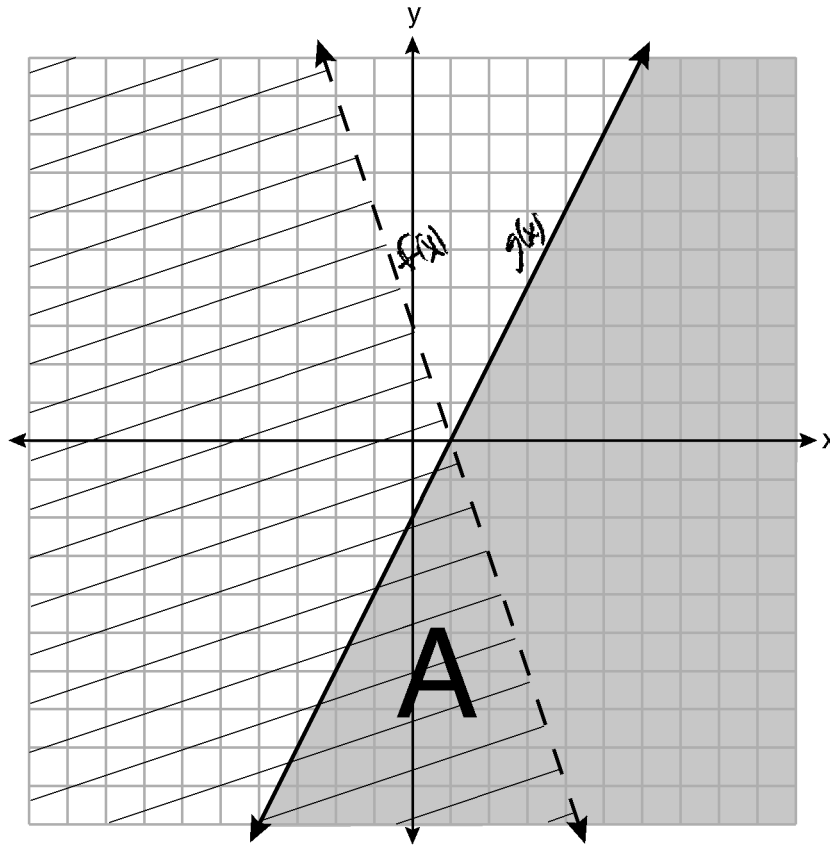
State what the entire gray region represents.

It represents the solution set of one of the inequalities

**Score 2:** The student correctly stated what each of the two regions represent.

Question 36

36 A system of inequalities is graphed on the set of axes below.



State the system of inequalities represented by the graph.

$$f(x) > 3x + 3$$
$$g(x) \leq 2x - 2$$

State what region A represents.

*It represents the area in which the systems equal each other*

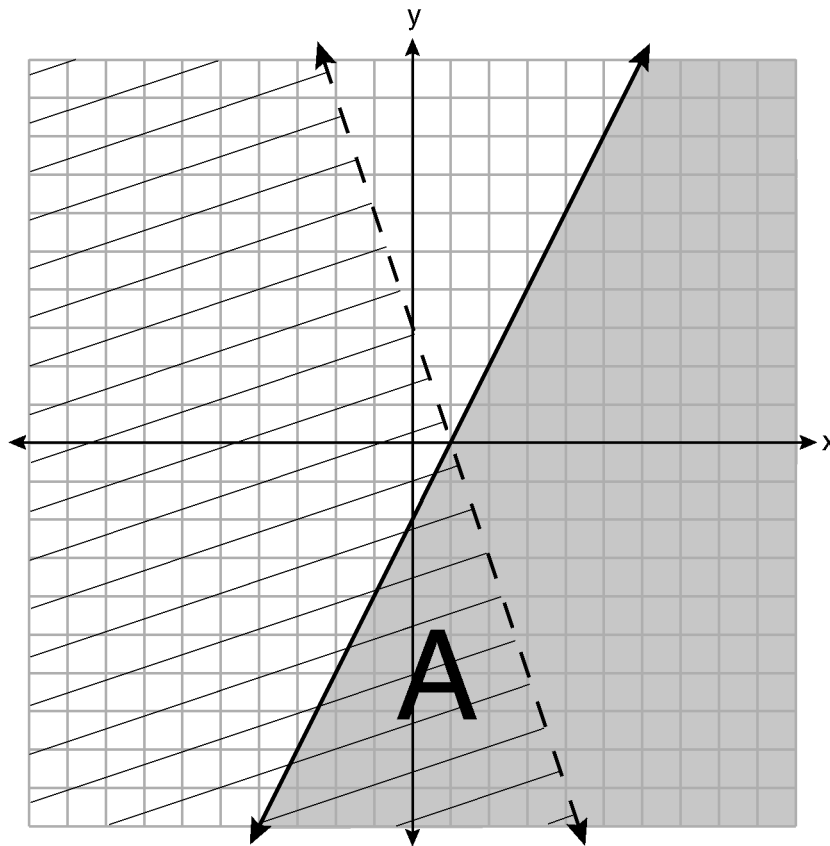
State what the entire gray region represents.

*It represents the values which make up that system.*

**Score 1:** The student wrote one correct inequality.

Question 36

36 A system of inequalities is graphed on the set of axes below.



State the system of inequalities represented by the graph.

State what region A represents.

All of the points that work with the equations

State what the entire gray region represents.

Which points do not work

**Score 0:** The student did not show any correct work.



**Question 37**

**37** When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$\begin{aligned}4c + 3f &= 16.53 \\5c + 4f &= 21.11\end{aligned}$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

$$\begin{aligned}5c + 4f &= 21.11 \\5(2.49) + 4(2.87) &= 21.11 \\12.45 + 11.48 &= 23.93 \\ \text{No, } 23.93 &\text{ does not} = 21.11\end{aligned}$$

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$\begin{aligned}4(4c + 3f &= 16.53) \\3(5c + 4f &= 21.11) \\ \hline 16c + 12f &= 66.12 \\ - (15c + 12f &= 63.33) \\ \hline c &= 2.79 \\ \\ 5(2.79) + 4f &= 21.11 \\ 13.95 + 4f &= 21.11 \\ 4f &= 7.16 \\ f &= 1.79\end{aligned}$$

**Score 6:** The student gave a complete and correct response.

**Question 37**

37 When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$\begin{aligned} 5c + 4f &= 21 \\ 4c + 3f &= 16.53 \end{aligned}$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87. Are they correct? Justify your answer.

$$B = 4c + 3f = 16.53 \quad G = 5c + 4f = 21.11$$

$$5c + 4f = 21.11$$

$$5(2.49) + 4(2.87) \neq 21.11$$

The green's is incorrect because when I plugged it into the equation  $5c + 4f = 21.11$ , it was not equivalent.

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$\begin{aligned} 3(5c + 4f &= 21.11) \quad \times 3 \\ -4(4c + 3f &= 16.53) \quad \times -4 \\ \hline 15c + 12f &= 63.33 \\ -16c - 12f &= -66.12 \\ \hline -1c &= -3.12 \\ \hline -1 & \quad -1 \\ \hline c &= 3.12 \end{aligned}$$

$$\begin{aligned} 4(3.12) + 3f &= 16.53 \\ 12.48 + 3f &= 16.53 \\ -12.48 & \quad -12.48 \\ \hline 3f &= 4.05 \\ \hline 3 & \quad 3 \\ \hline f &= 1.35 \end{aligned}$$

\$3.12 was the cost for cheeseburgers	\$1.35 was the cost for fries
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**Score 5:** The student wrote one incorrect equation, but solved the system appropriately.

**Question 37**

**37** When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$4c + 3f = 16.53$$

$$5c + 4f = 21.11$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

$$\begin{array}{r} 5(2.49) = 12.45 \\ 4(2.87) = 11.48 \\ \hline \$23.93 \end{array}$$

The prices are incorrect because they don't add to \$21.11

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$\begin{array}{r} 4[4c + 3f = 16.53] \\ - 3[5c + 4f = 21.11] \\ \hline 16c + 12f = 66.12 \\ + -15c - 12f = -63.33 \\ \hline c = 2.79 \end{array}$$

Cheeseburgers cost \$2.79 each.

**Score 5:** The student showed correct work, but only found the cost of one cheeseburger.

**Question 37**

**37** When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

Let  $x = \text{cheeseburger}$        $\$16.53 = 4x + 3y$   
 $y = \text{fries}$                        $\$21.11 = 5x + 4y$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87. Are they correct? Justify your answer.

$$\begin{array}{r} 2.49 \\ \times 5 \\ \hline 12.45 \end{array} \quad \begin{array}{r} 2.87 \\ \times 4 \\ \hline 11.48 \end{array}$$

$12.45 + 11.48 = 23.93$

They are incorrect because when you multiply \$2.49 by 5 cheeseburgers and \$2.87 by 4 fries. You'll get \$12.45 and \$11.48. Then you add them and get the total of \$23.93 which isn't the bill's amount.

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$\begin{array}{r} 4(16.53 = 4x + 3y) \rightarrow 66.12 = 4x + 12y \\ -3(21.11 = 5x + 4y) \rightarrow -63.33 = -15x - 12y \\ \hline 2.79 = 19x \\ 19 \quad 19 \\ \hline 0.1468421053 = x \\ 0.15 = x \end{array}$$

$$\begin{array}{r} 21.11 = 5x + 4y \\ 21.11 = 5(0.15) + 4y \\ 21.11 = 0.75 + 4y \\ -0.75 \quad -0.75 \\ \hline 20.36 = 4y \\ 4 \quad 4 \\ \hline 5.09 = y \end{array}$$

A cheeseburger cost \$0.15  
 A medium fry cost \$5.09

**Score 4:** The student did not multiply the  $4x$  by 4 and made an error combining the  $x$  terms when solving for the cost of a cheeseburger.

**Question 37**

37 When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$\begin{aligned}5c + 4f &= 21.11 \\4c + 3f &= 16.53\end{aligned}$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

$$2.49(5) + 2.87(4) =$$

No, the price would have come out to 23.93 \$!  $11.48 + 12.45 = 23.93$

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$\begin{array}{r}5c + 4f = 21.11 \\-4c - 3f = -16.53 \\ \hline c + f = 4.58\end{array}$$

**Score 4:** The student only found the sum of one cheeseburger and one order of medium fries.

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**Question 37**

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37 When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$\begin{aligned}5c + 4f &= 21.11 \\ +4c + 3f &= 16.53\end{aligned}$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

$$5(2.49) + 4(2.87) = 23.93$$

No, the total would have been \$23.93  
instead of 21.11

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$9c + 7f = 37.64$$

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**Score 3:** The student wrote two correct equations and a correct justification.

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**Question 37**

---

**37** When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$3c + 4f = 16.53$$
$$5c + 4f = 21.11$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

$$5(2.49) + 4(2.87) = 21.11$$
$$12.45 + 11.48 = 23.93 \text{ No}$$

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

---

**Score 2:** The student wrote one correct equation and gave a correct justification.

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**Question 37**

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37 When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$4 \times f + 5 \times c \geq 21.11$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

$$\begin{array}{l} 4 \times 2.87 = 11.48 \\ 5 \times 2.49 = 12.45 \\ \hline 23.93 \end{array}$$

No, because it  
does not add up

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

Cost of one cheeseburger = 4 dollars

Cost of one medium fry = 5 dollars

**Score 1:** The student gave a correct justification.



Question 37

37 When visiting friends in a state that has no sales tax, two families went to a fast-food restaurant for lunch. The Browns bought 4 cheeseburgers and 3 medium fries for \$16.53. The Greens bought 5 cheeseburgers and 4 medium fries for \$21.11.

Using  $c$  for the cost of a cheeseburger and  $f$  for the cost of medium fries, write a system of equations that models this situation.

$$4c + 3f = 16.53$$

The Greens said that since their bill was \$21.11, each cheeseburger must cost \$2.49 and each order of medium fries must cost \$2.87 each. Are they correct? Justify your answer.

No, according to a calculation the total would be \$23.93

Using your equations, algebraically determine both the cost of one cheeseburger and the cost of one order of medium fries.

$$4c + 3f = 16.53$$

**Score 0:** The student did not justify the \$23.93, and no further correct work was shown.