

<b>Problem</b>	1	2	3	4	5	6	7	8	9	10	11	12
<b>Lesson Origin</b>	20,21, 23-25, 28	24-27	20	19, 28	20	30	21	30	26, 27	19, 29	25	26

<b>Problem</b>	13	14	15	16	17	18	19	20	21	22	23	24
<b>Lesson Origin</b>	21	22, 24	24, 26	23, 24	29	19, 28	30	20	29	23	29	20

<b>Problem</b>	25	26	27	28	29	30	31	32	33	34	35
<b>Lesson Origin</b>	30	20	29	30	26	21	27	26,2 7	19,2 9	25	22

1.

A.

Total Area – Area of the yard = Garden

$$(8x^2 + 10x + 2) - (6x^2 + 10x + 2)$$

$$2x^2$$

The garden has an area of  $2x^2$  square meters.

B.

Area/length = width

$$\frac{2x^2}{2x} = w$$

$$w = x$$

$$P = 2L + 2w$$

$$P = 2(2x) + 2(x)$$

$$P = 4x + 2x$$

$$P = 6x$$

The garden needs  $6x$  meters of fencing.

C.

$$TA = 8x^2 + 10x + 2, l = 4x + 1$$

$$8x^2 + 10x + 2$$

$$2(4x^2 + 5x + 1)$$

$$2(4x + 1)(x + 1)$$

$$2(x + 1) = 2x + 2$$

The width of the yard is  $(2x + 2)$  meters.

The length of the yard is already given as  $4x + 1$ . This gives your student one of the two expressions for the factored expression. Since the remaining factors are 2 and  $(x + 1)$ , they should be multiplied together to find the width of the yard.

D.

$$8x^2 + 10x + 2 = 104$$

$$8x^2 + 10x - 102 = 0$$

$$2(4x^2 + 5x - 51) = 0$$

$$2(4x + 17)(x - 3) = 0$$

$$4x + 17 = 0 \quad x - 3 = 0$$

$$4x = -17$$

$$x = -\frac{17}{4} \quad x = 3$$

The only solution is  $x = 3$ , since the dimensions of the yard cannot be negative.

Recall that some answers to quadratic equations can be extraneous, and your student will need to eliminate the answer that does not make the problem true within the given context.

2.

A.

Negative two   times the quantity    $x$  minus one squared   equals   negative eight.

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

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

B.

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

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

$$-2x^2 + 4x - 2 = -8$$

$$-2x^2 + 4x + 6 = 0$$

$$-2(x^2 - 2x - 3) = 0$$

$$-2(x - 3)(x + 1) = 0$$

$$-2 = 0, \quad x - 3 = 0, \quad x + 1 = 0$$

$$x = 3, \quad x = -1$$

$$x = -1, 3$$

The two solutions represent the points where the quadratic equation will intersect the  $x$ -axis (the  $x$ -intercepts).

C.

Solid line, shade above (inside)

$$\text{Vertex: } x = -\left(\frac{b}{2a}\right) = -\left(\frac{-2}{2(1)}\right) = 1$$

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

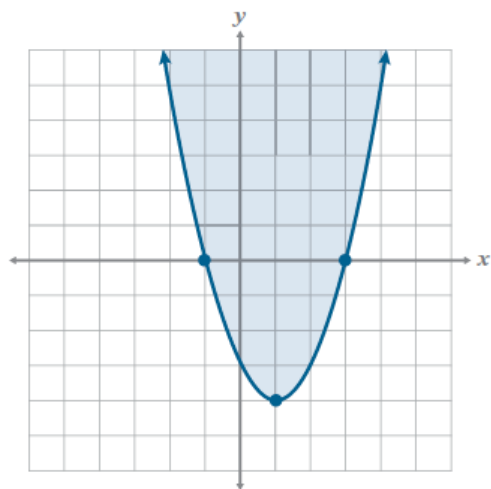
Vertex: (1, -4)

 $y$ -intercept: (0, -3)

$$\text{Solutions: } x^2 - 2x - 3 = 0$$

$$(x - 3)(x + 1) = 0$$

$$x = 3, -1$$



D.

Sample: The equation (in part B) has 2 solutions because it is a parabola that intersects the  $x$ -axis at two points. The inequality (in part C) intersects the  $x$ -axis at the same two points as the parabola in part B. However, an inequality has an infinite number of solutions that is represented by the shaded region, including  $x = -1, 3$ .

The domain of both the equation and the inequality are all real numbers. They also share the same axis of symmetry at  $x = 1$ .

Since the value of  $a = -2$  for the equation the parabola has a maximum point at (1, 8). This makes the range  $(-\infty, 8]$ . The inequality has a minimum vertex at (1, -4). This range is  $[-4, \infty)$ .

3. B

There is no work for this problem.

Distractor Rationale:

- A) This does not consider the largest exponent for the degree.
- C) This does not recognise that there are 3 terms in the expression.
- D) This does not consider the largest exponent for the degree.

4. C

$$\frac{(5^4 v^3)^{-\frac{1}{2}}}{w^{-2}}$$

$$\frac{(5^{-2} v^{-\frac{3}{2}})}{w^{-2}}$$

$$\frac{w^2}{(5^2 v^{\frac{3}{2}})}$$

$$\frac{w^2}{(25v^{\frac{3}{2}})}$$

Distractor Rationale:

- A) This does not distribute  $(-\frac{1}{2})$  to  $5^4$ .
- B) This does not have the coefficient in the denominator, and the exponent for  $v$  is incorrect.
- D) This does not distribute  $(-\frac{1}{2})$  to  $5^4$ .

5. C

$$A = s^2$$

$$A = (x + 9)(x + 9)$$

$$A = x^2 + 18x + 81 \text{ in}^2$$

Distractor Rationale:

- A) This does not multiply all terms of  $(x + 9)(x + 9)$  together.
- B) This is the perimeter of the square.
- D) This multiplies the side by 2 rather than squaring the side of the square.

6. A

$$y = a(1 + r)^t$$

$$y = 100(1 + 0.02)^5$$

$$y = 110.41 \quad (\text{This is total amount of money})$$

$$110.41 - 100 = 10.41 \quad (\text{interest earned})$$

Distractor Rationale:

- B) This is the total money earned including interest, but the question only asks for the interest.
- C) This uses the rate of 20% rather than 2%.
- D) This uses the rate of 20% rather than 2%.

7. D

$$\text{GCF}(12, 24, 8) = 4$$

$$\text{GCF}(p^5, p^3, p^2) = p^2$$

Distractor Rationale:

- A) This has coefficients that are not common factors of all terms and do not factor out the greatest common variable.
- B) This has coefficients that are not common factors of all terms and do not factor out the greatest common variable.
- C) This does not take out the greatest common numerical factor.

8. C

$$y = a(b)^x \text{ where the } y\text{-intercept is } (0, a)$$

Distractor Rationale:

- A) This has the incorrect value for the coefficient  $a$ .
- B) This has the incorrect value for the coefficient  $a$  and has the incorrect value for  $b$  and does not follow order of operations.
- D) This has the incorrect value for  $b$  and does not follow the order of operations.

9. B

$$\text{Vertex: } (2, -1) \text{ where } h = 2, k = -1$$

$$y = a(x - h)^2 + k$$

Distractor Rationale:

- A) This represents a linear function because there is no exponent in the equation.
- C) This has the incorrect value for  $h$ .
- D) This has the incorrect value for  $h$ .

10. C

$$(w^5 w^n w^{-3})^2 = w^8$$

$$(w^{10} w^{2n} w^{-6}) = w^8$$

$$w^{(4+2n)} = w^8$$

$$4 + 2n = 8$$

$$2n = 4$$

$$n = 2$$

Distractor Rationale:

A) This ignores that the expression on the left is also raised to the second power.

B) This adds all exponents rather than multiplying by the second power.

D) This ignores that the expression on the left is also raised to the second power.

11. B

$$2x^2 + x = 36$$

$$2x^2 + x - 36 = 0$$

$$(2x + 9)(x - 4) = 0$$

$$2x + 9 = 0 \text{ or } x - 4 = 0$$

$$x = \frac{-9}{2} \text{ (This is not a possible dimension since length cannot be negative)}$$

$x = 4$ , so the one length is 4

$$A = 36$$

$$A = lw$$

$$A = 4w$$

$$w = 9$$

The two dimensions are 4 and 9.

Distractor Rationale:

A) This represents the two solutions to the equation, but length cannot be measured in a negative number of inches.

C) This represents the correct areas but does not make the equation true.

D) This represents the correct areas but does not make the equation true.

The only two answers that have  $x = 4$  are A and B. When multiplying the dimensions and  $-2.5$  times 4 does not equal 36. However, 4 times 9 does.

12. B

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

$$\text{AoS: } -\left(\frac{b}{2a}\right) = -\left(\frac{6}{2(1)}\right) = -3$$

$y$ -intercept: (0, -7)

The symmetric point will be (-6, -7)

Distractor Rationale:

A) This is the  $y$ -intercept, not the point symmetric to it.

C) This is one of the solutions to the given function.

D) This is the vertex of the parabola.

13. A

$$42xy + 7x + 18y^3 + 3y^2$$

$$7x(6y + 1) + 3y^2(6y + 1)$$

$$(6y + 1)(7x + 3y^2)$$

Distractor Rationale:

B) This incorrectly groups the terms after factoring.

C) This incorrectly groups the terms after factoring.

D) This does not have a squared term.

14. C

$$64c^2 - 81 \text{ This is a difference of squares}$$

$$(8c + 9)(8c - 9)$$

Distractor Rationale:

A) This represents perfect square trinomials when given a difference of two squares.

B) This represents perfect square trinomials when given a difference of two squares.

D) This divides 64 in half rather than taking the square root.

15. D

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

$$\text{Solutions: } (x - 3)(x + 2) = 0$$

$$x = 3, -2$$

$y$ -intercept: (0, -6)

$a$  is positive, parabola faces upward

Distractor Rationale:

A) This represents  $x = -3, 2$  rather than  $x = -2, 3$

B) This has no real solutions

C) This has a parabola opening in the incorrect direction.

16. A

$$5r^2 - 9r - 44$$
$$(5r + 11)(r - 4)$$

Distractor Rationale:

- B) This uses the correct factors but the signs of the terms are incorrect.
- C) This uses the correct factors but the signs of the terms are incorrect.
- D) This does not use the correct factor for 44 so that the middle term adds to  $-9$ .

17. C

$$\sqrt[3]{a^{13}}$$
$$a^{\frac{13}{3}}$$
$$a^4 a^{\frac{1}{3}}$$
$$a^4 \sqrt[3]{a}$$

Distractor Rationale:

- A) This subtracts the exponents.
- B) This uses an index of 2 rather than 3.
- D) This switches places with the radicand and the coefficient.

18. D

$$V = lwh$$

$$30x^4 y^5 = (5xy^3)(3xy)(w)$$

$$30x^4 y^5 = 15x^2 y^4 w$$

$$\frac{30x^4 y^5}{15x^2 y^4} = w$$

$$2x^2 y = w$$

Distractor Rationale:

- A) This multiplies all the terms together.
- B) This uses only one of the two given dimensions when dividing.
- C) This uses only one of the two given dimensions when dividing.

19. D

$f(x)$  is decreasing as  $x$  increases. This is decay.

$$\frac{125}{625} = \frac{1}{5} \text{ The common ratio is } \frac{1}{5}.$$

Distractor Rationale:

- A) This names the function as a growth function and names the common ratio as 5.
- B) This names the function as a growth function.
- C) This names the common ratio as 5.

20. C

$$\begin{aligned} (x^2 - Q)(x + 3) &= x^3 + 3x^2 - 9x - 27 \\ x^3 + 3x^2 - Qx - 3Q &= x^3 + 3x^2 - 9x - 27 \\ -Qx &= -9x \\ Q &= 9 \end{aligned}$$

Distractor Rationale:

- A) This is one of the other coefficients.
- B) This is one of the other coefficients.
- D) This would result in all terms being positive in the expression.

21. C

$$\begin{aligned} (32)^{\frac{1}{2}} &= 4a \\ (2^5)^{\frac{1}{2}} &= (2^2)a \\ 2^{\frac{5}{2}} &= (2^2)a \\ \frac{2^{\frac{5}{2}}}{2^2} &= a \\ 2^{\frac{1}{2}} &= a \end{aligned}$$

Distractor Rationale:

- A) This would be  $(128)^{\frac{1}{2}}$  on the right side of the equation.
- B) This results in the base 32 but ignores the one-half power.
- D) This results in  $2^6$ , or 64, on the right side of the equation.

22. D

$$x^2 - 5x - 6$$

$$(x - 6)(x + 1)$$

Distractor Rationale:

- A) This does not use factors that will add to  $-5x$ .  
 B) This does not use factors that will add to  $-5x$ .  
 C) This uses the correct factors but the signs will result in  $+5x$ .

23. A

$$\sqrt{n} - 4 = 6$$

$$\sqrt{n} = 10$$

$$(\sqrt{n})^2 = 10^2$$

$$n = 100$$

Distractor Rationale:

- B) This does not square both sides.  
 C) This subtracts 4 from 6 rather than adding.  
 D) This subtracts 4 from 6 rather than adding.

24. B

$$(4x^2 + 5x - 3) - (3x^3 + 4x^2 + 5)$$

$$4x^2 + 5x - 3 - 3x^3 - 4x^2 - 5$$

$$- 3x^3 + 4x^2 - 4x^2 + 5x - 3 - 5$$

$$- 3x^3 + 5x - 8$$

Distractor Rationale:

- A) This is not in standard form and has the incorrect exponent for  $-3x$ .  
 C) This does not subtract the second degree terms or the constants.  
 D) This does not subtract the constants.

25. A

$$y = a(b)^x; b = \text{common ratio, } y\text{-intercept: } (0, a)$$

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

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

Distractor Rationale:

- B) This represents an intercept of  $(0, 2)$   
 C) This shifts the graph up or down 2 spaces from  $(0, 1)$ .  
 D) This shifts the graph up or down 2 spaces from  $(0, 1)$ .

**26. C**

$$- 2y^4(y^3 - 3y^2 + 7)$$
$$- 2y^7 + 6y^6 - 14y^4$$

Distractor Rationale:

- A) This multiplies the exponents rather than adding them (exponent rule 1).
- B) This multiplies the exponents rather than adding them (exponent rule 1) and has the incorrect sign for the second term.
- D) This has the incorrect sign for the second term.

**27. B**

$$x^2 - 3 = 5$$

$$x^2 = 8$$

$$x = \pm \sqrt{8}$$

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

Distractor Rationale:

- A) This does not include all solutions to the equation.
- C) This does not take the square root of 4 when simplifying.
- D) This ignores that  $x$  is raised to the second power.

**28. D**

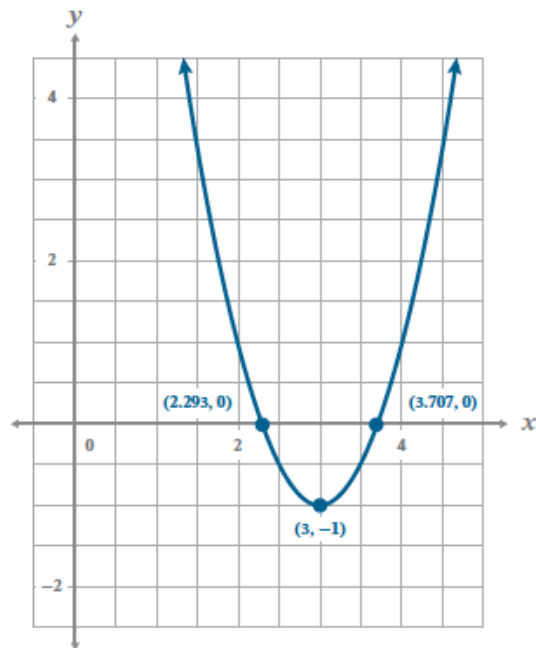
There is no work for this problem.

Distractor Rationale:

- A) This is the range for a growth function when the graph is a decay function.
- B) The range cannot be equal to  $-2$ , since it will never reach this number.
- C) The range cannot be equal to  $-2$ , since it will never reach this number.

29. C

$$y = 2x^2 - 12x + 17$$



Distractor Rationale:

- A) This is not the exact values of the solution.
- B) This uses the coefficient of  $x^2$  and the  $y$ -intercept.
- D) This uses the  $\pm$  symbol incorrectly because this cannot be found by taking the square root.

30. B

$$32n^3 + 48n^2 + 16mn$$

$$\text{GCF}(32, 48, 16) = 16$$

$$\text{GCF}(n^3, n^2, mn) = n$$

$$16n(2n^2 + 3n + m)$$

Distractor Rationale:

- A) This does not factor out the greatest factor and drops one of the terms when factoring, making it impossible to get back to the original expression.
- C) This drops one of the terms when factoring, making it impossible to get back to the original expression.
- D) This does not factor out the greatest factor.

31. A

There is no work for this problem.

Distractor Rationale:

B) This has the graph shifting right instead of left.

C) This says that the graph is narrower than the parent function when a fractional  $a$ -value will make the graph wider.D) This has the graph shifting right instead of left and says that the graph is narrower than the parent function when a fractional  $a$ -value will make the graph wider.

32. D

Vertex:  $(-3, -5)$ ;  $h = -3, k = -5$ Downward facing parabola,  $a < 0$ 

The domain of all quadratic functions is all real numbers.

The range for downwards facing parabolas is  $(-\infty, k]$ .

Distractor Rationale:

A) This uses  $(h, k)$  for the value of the range.B) This represents the function when  $a = 1$ , rather than  $a = -1$ .C) This uses the  $h$ -value rather than the  $k$ -value for the range.

33.

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

$\frac{x}{2}$

$x\sqrt{2x}$

$\sqrt{2x^3}$

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

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

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

Distractor Rationale:

The second choice would be the answer if  $\left(\frac{1}{2}\right)$  was not an exponent.

34.

- 1  
 2  
 5  
 10

$$5x^2 - 4x = 4x^2 + 3x - 10$$

$$x^2 - 7x + 10 = 0$$

$$(x - 5)(x - 2) = 0$$

$$x - 5 = 0 \text{ and } x - 2 = 0$$

$$x = 5, 2$$

Distractor Rationale:

The values 1 and 10 are factors but do not make the equation true.

35.

- Two addition symbols.  
 One addition and one subtraction symbol.  
 Two subtraction symbols  
 Cannot be determined without values for  $a$ ,  $b$ , and  $c$ .

There is no work for this problem.

Distractor rationale:

When  $c$  is negative, there is one addition and subtraction sign. Knowing the sign patterns before the values for  $a$ ,  $b$ , and  $c$  helps determine possible factor pairs.