1) Which expression is equivalent to $121x^2 - 64y^2$?

a) $(11x - 16y)(11x + 16y)$
b) $(11x - 16y)(11x - 16y)$
c) $(11x + 8y)(11x + 8y)$
d) $(11x + 8y)(11x - 8y)$

$(11x+8y)(11x-8y)$

2) What is the common factor for the expression $24x^2 + 16x + 144$?

GCF: 8

a) 16
b) 8
c) $3x^2 + 2x + 18$
d) $8(x - 2)(3x^2 + 9)$

3) Which of these shows the complete factorization of $6x^2y^2 - 9xy - 42$?

$3(2x^2y^2 - 3xy - 14)$

$2x^3y^3$

a) $3(2xy^2 - 7)(xy^2 + 2)$
b) $(3xy + 6)(2xy - 7)$
c) $3(2xy - 7)(xy + 2)$
d) $(3xy^2 + 6)(2xy^2 - 7)$

$2xy \cdot xy = 2x^2y^2$

4) What are the zeros of the function represented by the quadratic expression $2x^2 + x - 3$?

$2x^2 + x - 3 = 0$
$x^2 + x - 6 = 0$
$(x - 2)(x + 3) = 0$
$x = 1, -3/2$

a) x = -3/2 and x = 1
b) x = -2/3 and x = 1
c) x = -1 and x = 2/3
d) x = -1 and x = -3/2

5) What is the vertex of the graph of $f(x) = x^2 + 10x - 9$?

$a=1 \quad b=10 \quad c=-9$

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

$x = \frac{-10}{2(1)} \quad x = -5$

$(-5)^2 + 10(-5) - 9$
$25 - 50 - 9$

a) (5, 66)
b) (-5, -9)
c) (5, -9)
d) (-5, -34)

6) Which of these is the result of completing the square for the expression $x^2 + 8x - 30$?

$x^2 + 8x + 16 = 30 + 16$

$\frac{1}{2} \cdot 8 = 4 \quad (x+4)^2 = 46$

a) $(x + 4)^2 - 30$
b) $(x + 4)^2 - 46$
c) $(x + 8)^2 - 30$
d) $(x + 8)^2 - 94$

7) Which of the following is a binomial factor of the polynomial $x^2 + 10x - 24$?

1, 24 2, 12, 6, 4

$(x - 2)(x + 12)$

a) (x + 4)
b) (x - 12)
c) (x - 4)
d) (x + 12)

8) Factor the trinomial $x^2 + 6x - 40$.

$(x-4)(x+10)$

40
1, 40
2, 20
5, 8
4, 6
4, 10

a) (x + 8)(x - 5)
b) (x + 10)(x - 4)
c) (x - 10)(x + 4)
d) (x + 12)(x - 6)

9) Factor $2x^2 + 18x + 40$.

$2(x^2 + 9x + 20)$

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

a) 2(x + 5)(x - 4)
b) 2(x - 5)(x+4)
c) 2(x + 4)(x + 5)
d) 2(x - 4)(x - 5)

10) Consider the equation $(2x + 1)^2 - 5 = 3x^2 + 1$, if you were to use the quadratic formula, what could be the values of a, b, and c?

$4x^2 + 4x + 1 - 5 = 3x^2 + 1$
$-3x^2 \qquad -3x^2$
$x^2 + 4x - 5$

a) a = 4, b = -3, c = 5
b) a = 2, b = -4, c = 5
c) a = 1, b = 4, c = -5
d) a = 5, b = 2, c = -4

11) What is the y-intercept of $y = 5x^2 + 18x + 3$?

(0, 3)

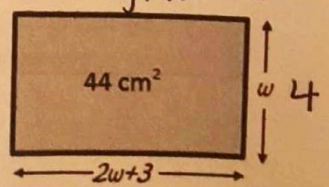
a) (0,3)
b) (3,0)
c) (0,-3)
d) (-3,0)

12) The length of the rectangle is 3 cm more than twice the width. If the area of the rectangle is 44 cm², what is the width of the rectangle?

Plug in answer

$A = lw$

a) 2 cm
b) 11 cm
c) 4 cm
d) 22 cm



$2(4) + 3$
$11 \stackrel{?}{=} 4$

13) Solve by factoring and use the zero-product property:

$x^2 + 6x - 40 = 0.$

Polysolv!

a) x = 10, x = -4
b) x = -8, x = 5
c) x = -10, x = 4
d) x = -5, x = 8

$(x-4)(x+10)=0$

$x=4, x=-10$

14) Find the solutions to the quadratic equation:

$2x^2 - 7x - 4 = 0$

Polysolv

a) x = ½, -2
b) x = ¼, -4
c) x = - ¼, 2
d) x = -½, 4

$x^2-7x-8=0$

$(x+1)(x-8)=0$

$x=-1, 8$

15) Solve the quadratic equation $x^2 - 6x - 3 = 0$ by completing the square.

a) $x = 3 \pm 2\sqrt{3}$
b) $x = -3 \pm 2\sqrt{3}$
c) $x = 3 \pm \sqrt{6}$
d) $x = -3 \pm 2\sqrt{6}$

$x^2-6x+9=3+9$

$\sqrt{(x-3)^2}=\sqrt{12}$

$x=3\pm\sqrt{4}\sqrt{3}$

$x=3\pm2\sqrt{3}$

16) Solve the quadratic equation $2x^2 - 5x = 1$.

a) $x = \frac{5\pm\sqrt{33}}{4}$
b) $x = \frac{-5\pm\sqrt{33}}{2}$
c) $x = \frac{-5\pm\sqrt{17}}{4}$
d) $x = \frac{5\pm\sqrt{17}}{2}$

$2x^2-5x-1=0$

$x=\frac{-(-5)\pm\sqrt{(-5)^2-4(2)(1)}}{2(2)}$

$x=\frac{5\pm\sqrt{33}}{4}$

17) A student named Scott could determine the solution of a quadratic equation was:

$x = \frac{5 \pm \sqrt{7}}{3}$

$\frac{5\pm\sqrt{7}}{3}$

Which of the following shows the correct approximation of his answer?

a) $x \approx \pm 4.410$
b) $x \approx 4.118$ or $x \approx 5.882$
c) $x \approx 0.785$ or $x \approx 2.549$
d) $x \approx -0.979$ or $x \approx 4.312$

18) If the zeros of a quadratic function are x = -2 and x = 4, what is the equation of the axis of symmetry?

a) x = 0
b) x = 1
c) x = 2
d) x = 3

$-2+4=2/2=1$

19) What are the solutions to the equation $x^2 - 5x = 14$?

a) x = -7 and x = -2
b) x = -14 and x = -1
c) x = -2 and x = 7
d) x = -1 and x = 14

$x^2-5x-14=0$

$(x-7)(x+2)=0$

$x=7, -2$

20) The expression $-x^2 + 70x - 600$ represents a company's profit for selling x items. For which number(s) of items sold is the company's profit equal to $0?

a) 0 items
b) 35 items
c) 10 items and 60 items
d) 20 items and 30 items

$-(x^2-70x+600)$

only ones that add to 70!

21) The formula for the area of a circle is $A = \pi r^2$. Which equation shows the formula in terms of r?

a) $r = \frac{2A}{\pi}$
b) $r = \frac{\sqrt{A}}{\pi}$
c) $r = \sqrt{\frac{A}{\pi}}$
d) $r = \frac{A}{2\pi}$

$\frac{A}{\pi}=\frac{\pi r^2}{\pi}$

$\sqrt{\frac{A}{\pi}}=\sqrt{r^2}$

22) What are the solutions to the equation $2x^2 - 2x - 12 = 0$?

a) x = -4 and x = 3
b) x = -3 and x = 4
c) x = -2 and x = 3
d) x = -6 and x = 2

$2(x^2-x-6)=0$

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

$x=3, -2$

23) What is the range of the graph of $y = -x^2 - 2x - 5$?

a. $(-\infty, 1]$
b. $[-1, \infty)$
c. $(-\infty, -4]$
d. $[-4, \infty)$

$x=\frac{-b}{2a}$ $x=\frac{-(-2)}{2(-1)}$

$x=2/-2$

$x=-1$

$-(-1)^2-2(-1)-5$

$-1+2-5$

$+1-5=-4$ (opens ↓)

24) What are the solutions to the equation $6x^2 - x - 40 = 0$? Poly solv!

a) x = -8/3 and x = -5/2
b) x = -8/3 and x = 5/2
c) x = 5/2 and x = 8/3
d) x = -5/2 and x = 8/3

25) Which parabola below has a maximum value?

a) $y = 4x^2 + 24x + 23$ up — opens ↓ a<0
b) $y = 0.1x^2 - 3x$ up
c) $y = -2x - 3x^2$ down
d) $y = x^2 + 2x + 20$ up

26) A garden measuring 8 feet by 12 feet will have a walkway around it. The walkway has a uniform width, and the area covered by the garden and the walkway is 192 square feet. What is the width of the walkway?

a) 2 feet
b) 3.5 feet
c) 4 feet
d) 6 feet

27) An object is thrown in the air with an initial velocity of 5 m/s from a height of 9 m. The equation $h(t) = -4.9t^2 + 5t + 9$ models the height of the object in meters after t seconds. About how many seconds does it take for the object to hit the ground? Round your answer to the nearest tenth of a second. $-4.9t^2+5t+9=0$

a) 0.940 second
b) 1.50 seconds
c) 2.00 seconds
d) 9.00 seconds

Plug in answers! or polysolv!

28) A baseball player hits a baseball that is modeled by the function $s(t) = -16t^2 + 80t + 4$ represents the height in feet of an object, from the ground after the time, t, in seconds.

About how long will it take the baseball to hit the ground? $-16t^2+80t+4=0$

a) 2 seconds
b) 3 seconds
c) 4 seconds
d) 5 seconds

plug in answers or polysolv!

29) A café's annual income depends on x, the number of customers. The function $l(x) = 4x^2 - 20x$ describes the café's total annual income. The function $C(x) = 2x^2 + 5$ describes the total amount the café spends in a year. The café's annual profit, P(x) is the difference between the annual income and the amount spent in a year. Which function describes P(x)? $(4x^2-20x)-(2x^2+5)$

a) $P(x) = 2x^2 - 20x - 5$
b) $P(x) = 4x^3 - 20x^2$
c) $P(x) = 6x^2 - 20x + 5$
d) $P(x) = 8x^4 - 40x^3 - 20x^2 - 100x$

$2x^2-20x$

30) What is the end behavior of the graph of $f(x) = -0.25x^2 - 2x + 1$? opens ↓

a) As x→ -∞, f(x)→∞, As x→ ∞, f(x) →∞
b) As x→ -∞, f(x)→-∞, As x→ ∞, f(x) →-∞
c) As x→ -∞, f(x)→-∞, As x→ ∞, f(x) →∞
d) As x→ -∞, f(x)→∞, As x→ -∞, f(x) →-∞

31) Which statement BEST describes how the graph of $g(x) = -3x^2$ compares to the graph of $f(x) = x^2$? opens ↓, stretch by 3

a) The graph of g(x) is a vertical stretch of f(x) by a factor of 3
b) The graph of g(x) is a reflection of f(x) across the x-axis
c) The graph of g(x) is a vertical shrink of f(x) by a factor of 1/3 and a reflection across the x-axis.
d) The graph of g(x) is a vertical stretch of f(x) by a factor of 3 and a reflection across the x-axis.

32) A flying disk is thrown into the air from a height of 25 feet at time t = 0. The function that models this situation is $h(t) = -16t^2 + 75t + 25$, where t is measured in seconds and h is the height in feet. What values of t best describe the times when the disk is flying in the air?

a) 0 < t < 5
b) 0 < t < 25
c) All real numbers (time can't be neg
d) All positive integers

All real #s include Neg #s & decimals.

33) Use this table to answer the question

x	-2	-1	0	1	2
f(x)	15	9	5	3	3

What is the average rate of change of f(x) over the interval $-2 \le f(x) \le 0$?

a) -10
b) -5
c) 5
d) 10

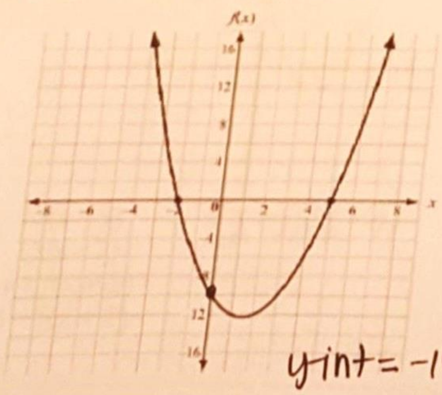
34) Which function has a range of $f(x) \le \frac{3}{4}$?

a) $f(x) = \frac{3}{4}x + 5$
b) $f(x) = -x^2 + \frac{3}{4}$
c) $f(x) = x^2 - \frac{3}{4}$
d) $f(x) = \frac{3}{4} - 5x$

35) Convert $y = x^2 - 12x + 40$ to vertex form.

a) $y = (x-6)^2 + 40$
b) $y = (x+6)^2 + 36$
c) $y = (x-6)^2 + 4$
d) $y = (x-12)^2 - 36$

36) Use the graph to answer the question



Which function is shown in the graph?

a) $f(x) = x^2 - 3x - 10$
b) $f(x) = x^2 + 3x - 10$
c) $f(x) = x^2 + x - 12$
d) $f(x) = x^2 - 5x - 8$

37) The function $f(t) = -16t^2 + 64t + 5$ models the height of the ball that was hit into the air, where t is measured in seconds and h is the height in feet. This table represents the height, g(t), of a second ball that was thrown into the air. Which statement BEST compares the length of time each ball is in the air?

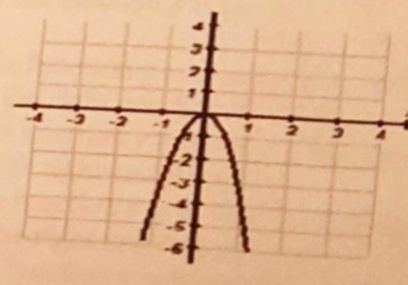
Time t (in sec)	0	1	2	3
Height g(t) (in ft)	4	36	36	4

a) The ball is represented by f(t) is in the air for about 5 seconds and the ball is represented by g(t) is in the air for about 3 seconds.
b) The ball represented by f(t) is in the air for about 3 seconds and the ball represented by g(t) is in the air for about 5 seconds
c) The ball represented by f(t) is in the air for about 3 seconds and the ball represented by g(t) is in the air for about 4 seconds
d) The ball represented by f(t) is in the air for about 4 seconds and the ball represented by g(t) is in the air for about 3 seconds

38) If the original parabola is defined by $y = x^2$, how would it change $y = 2(x-3)^2 + 1$ were graphed instead?

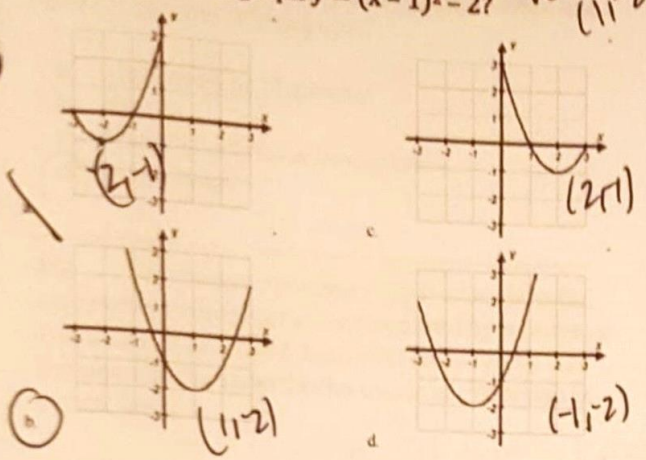
a) The parabola would be vertically stretched by a factor of 2, translated right 3, up 1
b) The parabola would be vertically compressed by a factor of ½, translated left 3, down 1
c) The parabola would be vertically compressed by a factor of ½, translated right 3, down 1
d) The parabola would be vertically stretched by a factor of 2, translated left 3, up 1

39) Which is the equation of the following parabola in vertex form?



a) $y = 4x^2$
b) $y = -4x^2$
c) $y = \frac{1}{4}x^2$
d) $y = -\frac{1}{4}x^2$

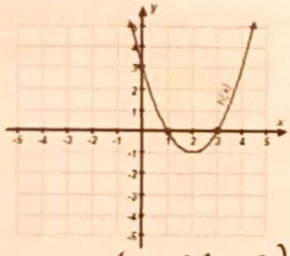
40) Which is the graph $y = (x-1)^2 - 2$? vertex: (1, -2)



41) If you place one of the foundation points of the St. Louis arch at the origin, you could roughly describe it as a parabola with the equation $y = -0.00635(x-315)^2 + 630$. How tall is the arch?

a) 200 ft. tall
b) 315 ft. tall
c) 630 ft. tall
d) 945 ft. tall

42) Consider the graph of the function shown below. Which of the following functions represent the quadratic function?



a) $f(x) = (x-1)(x-3)$ (x-1)(x-3)
b) $f(x) = (x-1)(x-2)$
c) $f(x) = (x+1)(x+3)$
d) $f(x) = (x+1)(x+2)$

43) A baseball is hit by a batter. The function $h(t) = -16t^2 + 48t + 2$ describes the height in feet of the baseball as a function of time t in seconds. What is the maximum height of the ball?

$x = \frac{-b}{2a}$ $x = \frac{-48}{2(-16)} = 1.5$

a) 16 ft.
b) 38 ft.
c) 48 ft.
d) 50 ft.

$-16(1.5)^2 + 48(1.5) + 2$

44) The table defines a quadratic function.

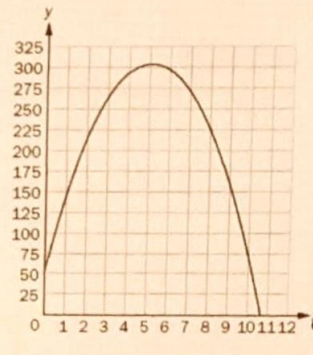
x	-1	0	1	3
y	5	1	-1	1

What is the average rate of change between $x = -1$ and $x = 1$?

slope = rise/run $\frac{-1-5}{1-(-1)} = \frac{-6}{2} = -3$

a) Undefined
b) -1/3
c) -3
d) -4

45) The graph shows the height, y, in meters of a rocket above sea level in terms of the time, t, in seconds since it was launched. The rocket landed at sea level.



What does the x-intercept represent in this situation?

a) The height from which the rocket was launched
b) The time it took the rocket to return to the ground
c) The total distance the rocket flew while it was in flight x-axis is not distance
d) The time it took the rocket to reach the highest point in its flight vertex

46) How would you shift the parent function $y = x^2$ to graph the function $y = (x-4)^2 + 5$? →4, ↑5

a) The function $y = x^2$ would be shifted 4 units to the right and 5 units down.
b) The function $y = x^2$ would be shifted 4 units to the right and 5 units up.
c) The function $y = x^2$ would be shifted 5 units to the right and 4 units down.
d) The function $y = x^2$ would be shifted 5 units to the left and 4 units up

47) The axis of symmetry of a parabola does not always contain which point?

a) Maximum or Minimum
b) Vertex
c) Midpoint of the x-intercepts
d) y-intercept

48) The parent function $f(x) = x^2$ is reflected across the x-axis, vertically stretched by a factor of 4 and translated right 3 units to create g (x). Use the description to write the quadratic function in vertex form.

$y = -4(x-3)^2+0$

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

49) Which function has its vertex below the x-axis?

a) $f(x) = x^2 - 8$ opens ↑ V: (0,-8)
b) $f(x) = (x-7)^2$ Vertex: (7,0) opens ↑
c) $f(x) = -2x^2$ Vertex: (0,0) opens ↓
d) $f(x) = -(x+3)^2$ Vertex: (-3,0), opens ↓

50) Does the function $f(x) = x^2 - 10x + 18$ have a maximum or a minimum? What are its coordinates?

opens up ∪

$x = \frac{-(-10)}{2(1)} = x = 5$

a) Maximum; (5, -7)
b) Minimum; (5, -7)
c) Maximum; (-5, -7)
d) Minimum; (-5, -7)

51) What are the factors of the equation

$x^2 - 6x + 5 = 0$

$(x-5)(x-1)$

a) $(x+1)(x+5)$
b) $(x+2)(x+3)$
c) $(x-1)(x-5)$
d) $(x-2)(x-3)$

52) Which of the following expressions below shows the complete factorization of the expression

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

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

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

a) $(2x^2 - 2x)(x+3)$
b) $2x(x^2 + 2x - 3)$
c) $2x(x-1)(x+3)$
d) $2(x^3 + 2x^2 - 3x)$

53) What is the value of the function $f(x) = x^2 - 5x + 2$ evaluated at $x = 2$?

$(2)^2 - 5(2) + 2$
$4 - 10 + 2 =$
$-6 + 2 = -4$

a) 16
b) 6
c) 2
d) -4