

Polynomial Functions

- 1 Simplify by combining like terms.

$$-3x^2 - 9x^2 - 4x - 4$$

- | | |
|---|-------------------------|
| A | $-12x^2 - 4x - 4$ |
| B | $-3x^2 - 4x - 4$ |
| C | $-3x^2 - 9x^2 - 4x - 4$ |
| D | $6x^2 - 4x - 4$ |

- 2 Simplify by combining like terms.

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

- | | | | |
|---|--|---|--------------------------------------|
| A | $-x^2 + \frac{8}{3}x - \frac{5}{2}$ | B | $-x^2 + \frac{7}{6}x - \frac{5}{2}$ |
| C | $-x^2 + \frac{8}{3}x + \frac{3}{2}x - \frac{5}{2}$ | D | $-x^2 + \frac{25}{6}x - \frac{5}{2}$ |

- 3 Which formula would create this type of graph?

Linear

- | | |
|---|---------------------|
| A | $y = a^x$ |
| B | $y = mx + b$ |
| C | $y = ax^2 + bx + c$ |
| D | $y = \sin(x)$ |

- 4 What quadratic equation, in standard form, comes from calculating the area of the painting?

A 9 by 5 painting has a border of width x on all sides. Its total area (border included) is 117.

- | | |
|---|--------------------------|
| A | $A(x) = 4x^2 + 28x + 45$ |
| B | $A(x) = 4x^2 + 26x + 45$ |

- 5 What quadratic equation, in standard form, comes from calculating the area of the parking lot?

A parking lot that is a rectangle shape is enclosed by x meters of a wall on one side and 15m of fencing on the other 3 sides.

- | | |
|---|-----------------------------|
| A | $A(x) = -0.5x^2 + 7.5x$ |
| B | $A(x) = -0.5x^2 + 9.5x - 2$ |

- 6 Valid rational roots are in the form p/q where q must be a factor of the leading coefficient. What is the leading coefficient in this polynomial?

$$f(x) = 2x^5 - 10x^4 + 6x^3 + 26x^2 - 16x - 24$$

- | | | | |
|---|-----|---|---|
| A | 26 | B | 6 |
| C | -10 | D | 2 |

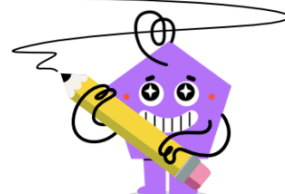
- 7 Valid rational roots are in the form p/q where q must be a factor of the leading coefficient. What is the leading coefficient in this polynomial?

$$f(x) = -40 + 5x^5 - 145x^2 - 55x^3 - 130x + 5x^4$$

- | | | | |
|---|------|---|------|
| A | 5 | B | -55 |
| C | -145 | D | -130 |

- 8 What is the highest power and leading coefficient of this function?

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



Polynomial Functions

9 What are the roots and multiplicities of this function?

$$f(x) = (x + 3)^3(x + 1)^2$$

A

$x = 2$ (multiplicity 1)
 $x = 3$ (multiplicity 1)

B

$x = -3$ (multiplicity 2)
 $x = -1$ (multiplicity 3)

C

$x = -3$ (multiplicity 3)
 $x = -2$ (multiplicity 2)

D

$x = 1$ (multiplicity 2)
 $x = 3$ (multiplicity 3)

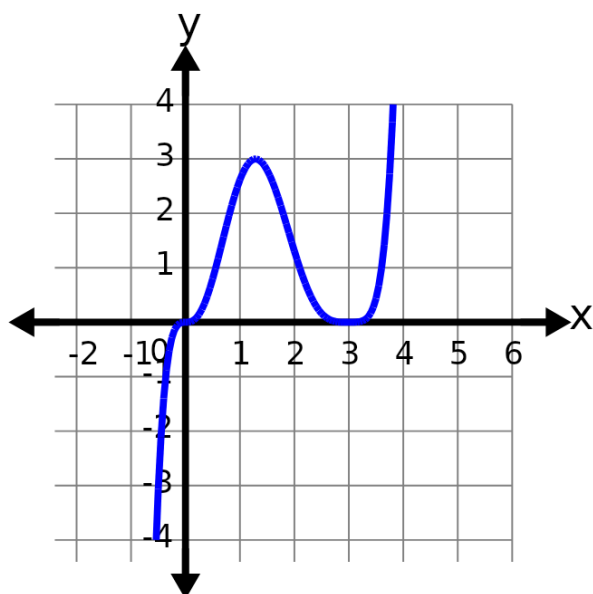
E

$x = -3$ (multiplicity 3)
 $x = -1$ (multiplicity 2)

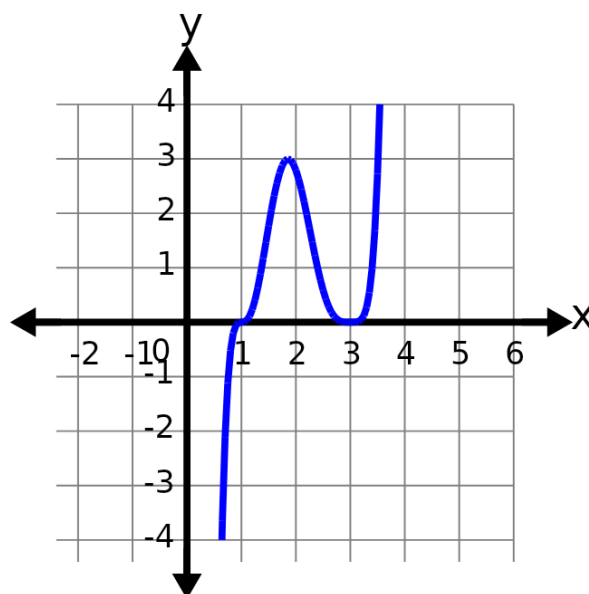
10 Which graph shows the x-intercept behaviour of this function?

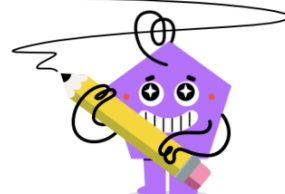
$$f(x) = (x - 1)^3(x - 3)^4$$

A



B





Polynomial Functions

11 What is the term in this number sequence when $b = 1$

$$b^2 + 6$$

A 8	B 7	C 6
D 9	E 3	F 1

12 Is $(x + 2)$ a factor of $f(x)$?

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

A Yes	B No
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13 Find the remainder when $f(x)$ is divided by $(x - 0)$.

$$f(x) = x^4 - x^3 - 11x^2 + 9x + 18$$

A 18	B -18
-------------	--------------

14 What are the critical values (y-values) of the extrema (maxima or minima)?

$$f(x) = -2x^3 + 6x - 4$$

A $y = -8$
B $y = -1, 1$
C $y = -8, 0$
D $y = -4$

15 What are the critical points of the function?

$$f(x) = -2x^3 - 18x^2 - 48x - 2$$

A $(-3, 34)$
B $(-4, 38)$ and $(-2, 30)$
C $(-4, 30)$ and $(-2, 38)$
D $(-4, 0)$ and $(-2, 0)$

16 What are the critical points of the function?

A $(-1, -52)$ and $(3, 12)$
B $(-1, 0)$ and $(3, 0)$
C $(-1, 12)$ and $(3, -52)$
D $(1, -20)$

17 Use grouping to factor this order 3 polynomial fully

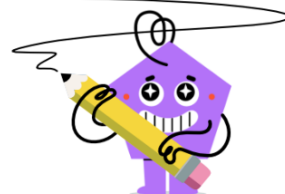
$$y^3 - 7y^2 - 16y + 112$$

A $(y - 7)(y + 4)(y + 4)$
B $(y - 7)(y - 4)(y + 4)$

18 Which answer is the same expression as this

$$6z^2 + 19z + 10$$

A $(2z + 2)(z + 5)$	B $(z - 2)(19z + 5)$
C $(19z + 2)(3z + 5)$	D $(3z + 2)(2z + 5)$
E $(3z + 2)(z + 5)$	



Polynomial Functions

19 Remove a common factor and factor this quadratic

$$3y^2 + 27y + 54$$

A

$$3(y + 6)(y + 3)$$

B

$$3(y + 54)(y + 3)$$

20 Which answer is the same expression as this

$$z^2 - 2z - 35$$

A

$$(z - 7)(2z + 5)$$

B

$$(z + 7)(z - 5)$$

C

$$(z + 7)(2z - 5)$$

D

$$(35z - 7)(z + 5)$$

E

$$(z - 7)(z + 5)$$

21 Use factor theorem and synthetic division to fully factor this polynomial.

$$x^3 + 3x^2 - 10x - 24$$

A

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

B

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

C

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

D

$$(x - 4)(x - 1)(x - 4)$$

22 Which answer is the same expression as this

$$np + 7p + 5n + 35$$

A

$$(n + 7)(p + 5)$$

B

$$(n + 7)(p - 5)$$

23 What end behaviour would this function have?

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

A

$$\text{as } x \rightarrow -\infty, y \rightarrow \infty$$

$$\text{as } x \rightarrow \infty, y \rightarrow -\infty$$

B

$$\text{as } x \rightarrow -\infty, y \rightarrow \infty$$

$$\text{as } x \rightarrow \infty, y \rightarrow \infty$$

24 Which function and intercept would show this x-intercept behaviour?
touches the x – axis without crossing and flattens

A

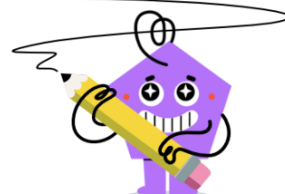
$$f(x) = (x + 3)^4(x - 1)^4$$

at $x = 1$

B

$$f(x) = (x + 3)^4(x - 1)^4$$

at $x = -3$

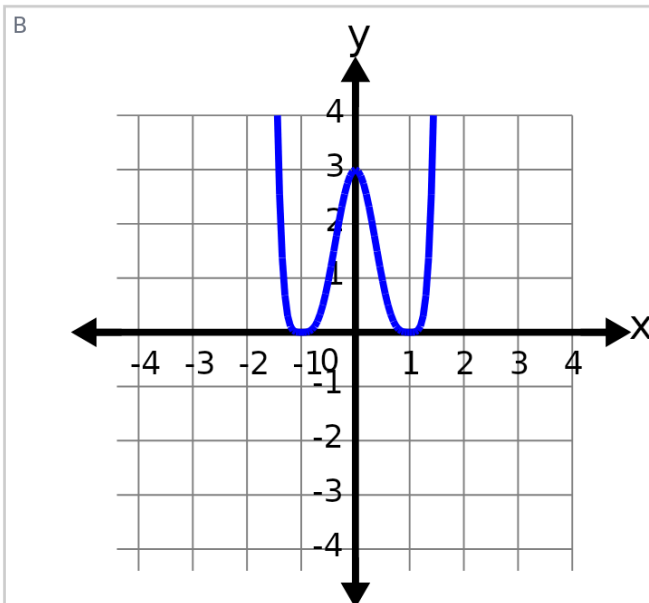
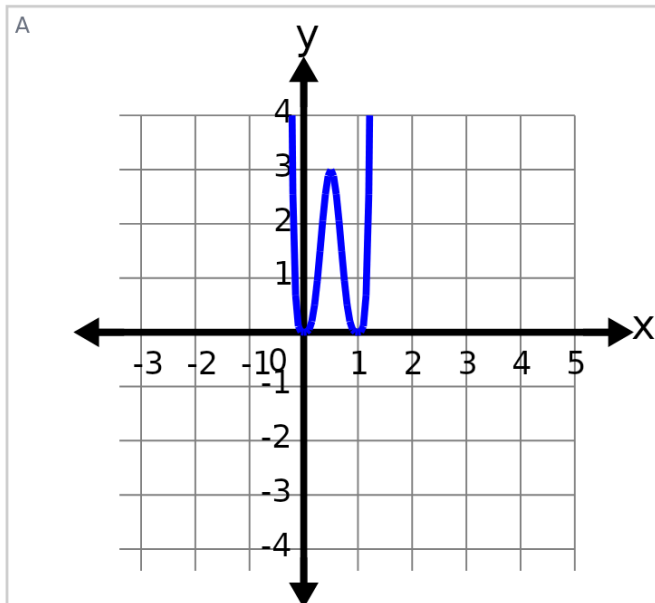


Polynomial Functions

25 Which graph shows these roots and multiplicities?

$x = -1$ (multiplicity 4)

$x = 1$ (multiplicity 4)



26 What roots and multiplicities would create this x-intercept behaviour?

at $x = -2$: crosses the x-axis and flattens

at $x = 1$: touches the x-axis without crossing and flattens

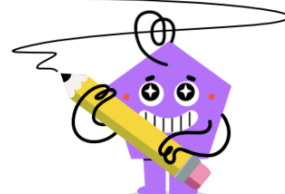
A
 $x = -2$ (multiplicity 4)
 $x = 1$ (multiplicity 3)

B
 $x = -2$ (multiplicity 3)
 $x = 1$ (multiplicity 4)

C
 $x = -1$ (multiplicity 4)
 $x = 2$ (multiplicity 3)

D
 $x = -2$ (multiplicity 4)
 $x = 1$ (multiplicity 4)

E
 $x = 3$ (multiplicity 1)
 $x = 4$ (multiplicity 1)



Polynomial Functions

27 What x-intercept behaviour would these roots and multiplicities create?

$$x = -3 \text{ (multiplicity 1)}$$

$$x = 3 \text{ (multiplicity 3)}$$

A

at $x = -3$: crosses the x – axis and flattens
at $x = 3$: crosses the x – axis

B

at $x = 1$: crosses the x – axis
at $x = 3$: crosses the x – axis and flattens

C

at $x = -3$: crosses the x – axis
at $x = 3$: crosses the x – axis and flattens

D

at $x = -3$: touches the x – axis without crossing
at $x = 3$: crosses the x – axis and flattens

28 Which function would have this x-intercept behaviour?

at $x = -2$: crosses the x – axis

at $x = 2$: crosses the x – axis

A

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

B

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

C

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

D

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

29 What end behaviour would this power and coefficient create?

A

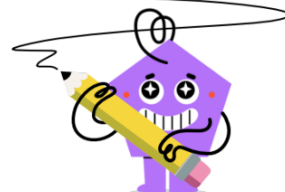
$$\text{as } x \rightarrow -\infty, y \rightarrow \infty$$

$$\text{as } x \rightarrow \infty, y \rightarrow -\infty$$

B

$$\text{as } x \rightarrow -\infty, y \rightarrow -\infty$$

$$\text{as } x \rightarrow \infty, y \rightarrow \infty$$



Polynomial Functions

30 Multiply and write the answer with like terms grouped.

$$(8x + 6)(-4x^2 - 8x - 5)$$

A	$-32x^3 - 88x^2 - 48x$
B	$32x^3 + 88x^2 + 88x + 30$
C	$-56x^2 - 112x - 70$
D	$-32x^3 - 88x^2 - 88x - 30$

31 Multiply and write the answer with like terms grouped.

$$(7x^3 + 2)(-6x^3 + x - 9)$$

A	$7x^4 - 63x^3 + 2x - 18$
B	$-42x^6 + 7x^4 - 75x^3 + 2x - 18$
C	$42x^6 + 7x^4 + 75x^3 + 2x + 18$
D	$-54x^3 + 9x - 81$

32 Multiply and write the answer with like terms grouped.

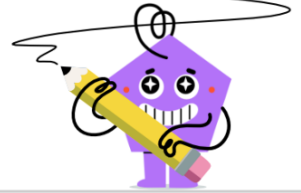
$$4x(-2x^4 + 4x^3 + 3x)$$

A	$8x^5 + 16x^4 + 12x^2$
B	$-8x^4 + 16x^3 + 12x$
C	$16x^4 + 12x^2$
D	$-8x^5 + 16x^4 + 12x^2$

33 Multiply and write the answer with like terms grouped.

$$(-x^3 - 7y^2)(-3x^2y^2 + 9x^2 + 5y^2)$$

A	$3x^5y^2 + 21x^2y^4 - 5x^3y^2 - 35y^4$
B	$3x^5y^2 + 21x^2y^4 + 9x^5 + 5x^3y^2 + 63x^2y^2 + 35y^4$
C	$3x^5y^2 + 21x^2y^4 - 9x^5 - 5x^3y^2 - 63x^2y^2 - 35y^4$
D	$24x^2y^2 - 72x^2 - 40y^2$



Polynomial Functions

34 Multiply and write the answer with like terms grouped.

$$(2x^4 - 9x^2y^2)(4y^4 + 4xy^2 - 5x^2)$$

A $8x^4y^4 + 36x^2y^6 + 8x^5y^2 + 36x^3y^4 + 10x^6 + 45x^4y^2$

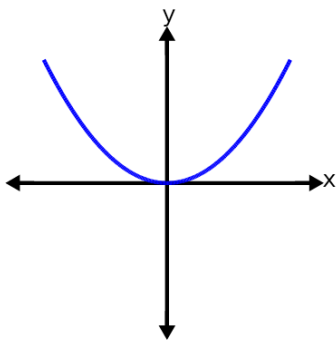
B $8x^4y^4 - 36x^2y^6 - 10x^6 + 45x^4y^2$

C $-28y^4 - 28xy^2 + 35x^2$

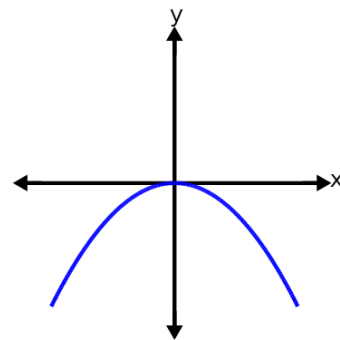
D $8x^4y^4 - 36x^2y^6 + 8x^5y^2 - 36x^3y^4 - 10x^6 + 45x^4y^2$

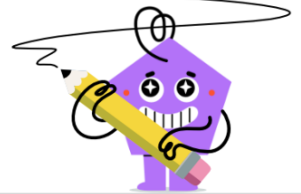
35 Which graph's end behaviour would this power and coefficient create?

A



B

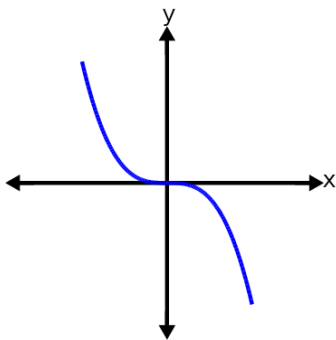




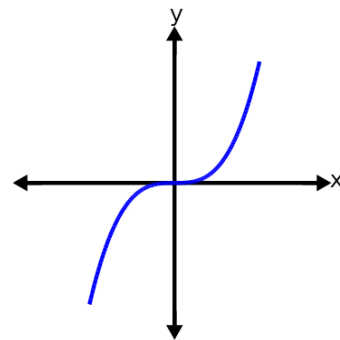
Polynomial Functions

36 Which graph's end behaviour would this power and coefficient create?

A



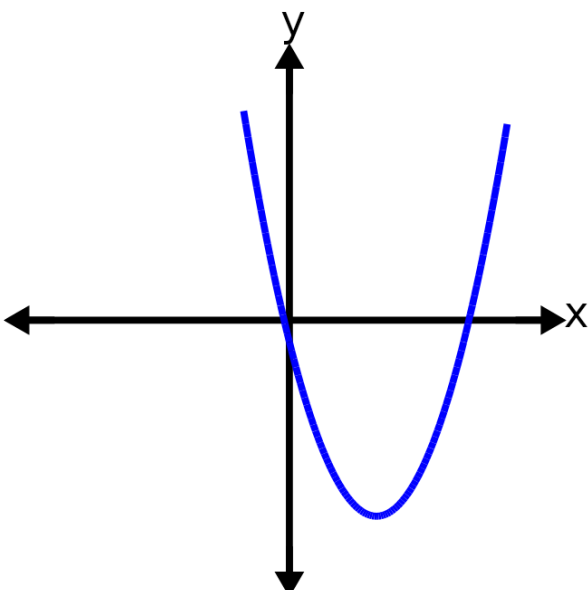
B



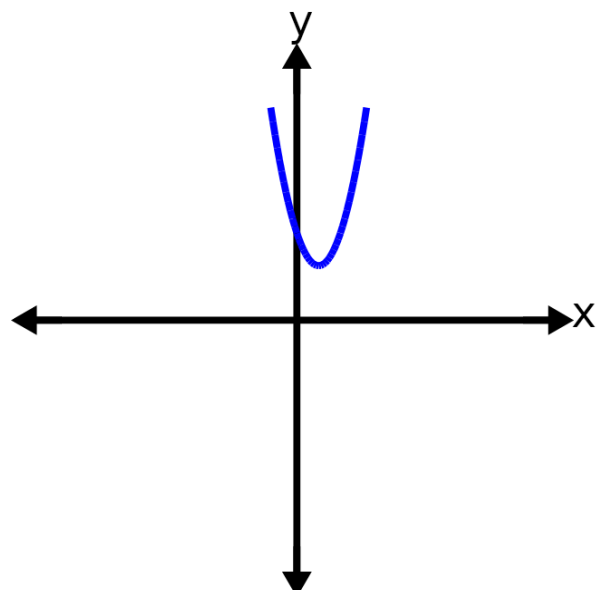
37 Which graph shows this quadratic equation?

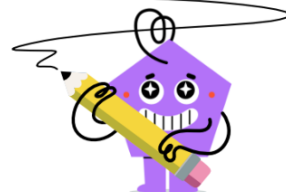
$$y = 0.5x^2 - 4x - 1$$

A



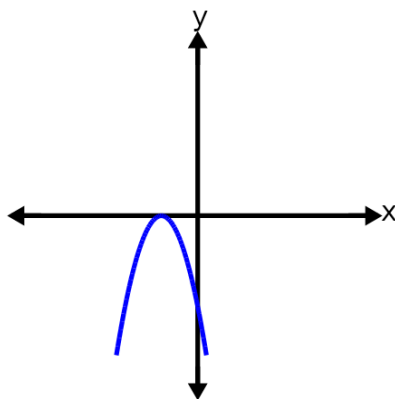
B





Polynomial Functions

38 Which root(s) would be valid for this quadratic function?



A

$$x = \frac{6.5 \pm i\sqrt{1.4}}{5.1}$$

B

$$x = -2.5$$

39 What roots (solutions) would this quadratic equation have?

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

A

$$\begin{aligned}x &= 4 \\x &= 1\end{aligned}$$

B

$$\begin{aligned}x &= 0 \\x &= 3\end{aligned}$$

C

$$\begin{aligned}x &= -6 \\x &= 5\end{aligned}$$

D

$$\begin{aligned}x &= 1 \\x &= -3\end{aligned}$$

40 What roots (solutions) would this quadratic equation have?

$$y = -4x^2 + 3x + 4$$

A

$$\begin{aligned}x &= 3.97 \\x &= -1.95\end{aligned}$$

B

$$\begin{aligned}x &= -0.69 \\x &= 1.44\end{aligned}$$

C

$$\begin{aligned}x &= -4.37 \\x &= 5.46\end{aligned}$$

D

$$\begin{aligned}x &= 1.3 \\x &= 5.32\end{aligned}$$