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Academic Year	2025-2026	Term	1	Subject	Math\Reveal
Grade\stream	12\General	Number Of MCQ	20	Marks Of MCQ	(2-4)
Maximum over Grade	100	Number Of FRQ	5	Marks Of FRQ	(7-8)
Exam Duration	150 min	Mode of Implementation	SwiftAssess & Paper-Based		
Calculator	Allowed	الألة الحاسبة	مسموحة		

Question السؤال	Lesson الدرس	Example/Exercise مثال/تمرين	Page الصفحة
الأسئلة الموضوعية - MCQ	1	Graph quadratic functions.	Example 1 & (1-4)
	2	Solve quadratic equations by graphing.	(4-12)
	3	Solve Quadratic Equations by Factoring.	Example 1 & Example 2 & Example 4
	4	Complete the square in quadratic expressions to solve quadratic equations.	Example 4
	5	Complete the square in quadratic expressions to solve quadratic equations.	Example 5
	6	Determine the number and type of roots of a quadratic equation.	Key Concept • Discriminant
	7	Graph quadratic inequalities in two variables.	(4-9) & (37-39)
	8	Graph and analyze polynomial functions.	Example 3
	9	Graph and analyze polynomial functions.	(15-20)
	10	Approximate zeros by graphing polynomial functions.	Example1
	11	Find extrema of polynomial functions.	Example2
	12	Add and subtract polynomials.	Example 2 & Example 3
	13	Multiply polynomials.	(16-26)
	14	Divide polynomials by using long division.	Example 1 & Example 2 & Example 3
	15	Solve polynomial equations by writing them in quadratic form and factoring.	Example 6 , Example 7 & (16-27)
	16	Graph exponential growth functions.	Example 1 & Example 2
	17	Graph exponential decay functions.	Example 6 & Example 7
	18	Distinguish among sample surveys, experiments, and observational studies.	Example 4 & (11-14)
	19	Classify sampling methods and identify bias in samples and survey questions.	Example3 & (7-10)
	20	Analyze normally distributed variables by using the Empirical Rule.	Key Concept • The Empirical Rule
الأسئلة المقالية - FRQ	21	Solve quadratic equations by using the Quadratic Formula.	(1-6,12,13)
	22	Divide polynomials by using synthetic division.	Example 4 & Example5
	23	Solve polynomial equations by factoring.	(1-10)
	24	Solve exponential equations in one variable.	(1-6)
	25	(a,b) Analyze standardized data and distributions by using z-values. (The table will be provided in the question)	Example 8 & 14

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"Attached are the Mathematics structure questions – Please ensure the correctness of the questions and page numbers from the structure guide in the LMS and the student textbook – I wish you all the best and success."

مرفق أسئلة هيكل الرياضيات - الرجاء التأكد من صحة الأسئلة وأرقام الصفحات من الهيكل في بوابة التعلم الإلكتروني والكتاب المدرسي - أتقنى لكم التوفيق والنجاح.

MCQ - الأسئلة الموضوعية

1	Graph quadratic functions.	Example 1 & (1-4)	4 & 9
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Lesson 1-1

Graphing Quadratic Functions

Example 1 Graph a Quadratic Function by Using a Table

Graph $f(x) = x^2 + 2x - 3$. State the domain and range.

Step 1 Analyze the function.

For $f(x) = x^2 + 2x - 3$. $a = 1$, $b = 2$, and $c = -3$.

c is the y -intercept, so the y -intercept is -3 .

Find the axis of symmetry.

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

Equation of the axis of symmetry

$$= -\frac{2}{2(1)}$$

$a = 1$, $b = 2$

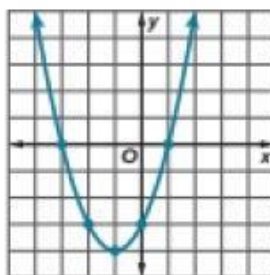
$$= -1$$

Simplify.

The equation of the axis of symmetry is $x = -1$, so the x -coordinate of the vertex is -1 . Because $a > 0$, the vertex is a minimum.

Step 2 Graph the function.

x	$x^2 + 2x - 3$	$(x, f(x))$
-3	$(-3)^2 + 2(-3) - 3$	$(-3, 0)$
-2	$(-2)^2 + 2(-2) - 3$	$(-2, -3)$
-1	$(-1)^2 + 2(-1) - 3$	$(-1, -4)$
0	$(0)^2 + 2(0) - 3$	$(0, -3)$
1	$(1)^2 + 2(1) - 3$	$(1, 0)$



Step 3 Analyze the graph.

The parabola extends to positive and negative infinity, so the domain is all real numbers. The range is $\{y \mid y \geq -4\}$.

Example 1

Graph each function. Then state the domain and range.

1. $f(x) = x^2 + 6x + 8$

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

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

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

الأسئلة الموضوعية - MCQ

2	Solve quadratic equations by graphing.	(4-12)	17
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Lesson 1-2**Solving Quadratic Equations by Graphing****Solve each equation by graphing.**

4. $x^2 - 10x + 21 = 0$

5. $4x^2 + 4x + 1 = 0$

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

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7. $x^2 + 2x - 3 = 0$

8. $-x^2 - 6x - 9 = 0$

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

10. $x^2 + 2x + 3 = 0$

11. $x^2 - 3x - 10 = 0$

12. $-x^2 - 8x - 16 = 0$

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الأسئلة الموضوعية - MCQ			
3	Solve Quadratic Equations by Factoring.	Example 1 & Example 2 & Example 4	27 & 28 & 29

Lesson 1-4 Solve Quadratic Equations by Factoring

Example 1 Factor by Using the Distributive Property

Solve $12x^2 - 2x = x$ by factoring. Check your solution.

$$12x^2 - 2x = x$$

Original equation

$$12x^2 - 3x = 0$$

Subtract x from each side.

$$3x(4x) - 3x(1) = 0$$

Factor the GCF.

$$3x(4x - 1) = 0$$

Distributive Property

$$3x = 0 \text{ or } 4x - 1 = 0$$

Zero Product Property

$$x = 0 \quad x = \frac{1}{4}$$

Solve.

Example 2 Factor a Trinomial

Solve $x^2 - 6x - 9 = 18$ by factoring. Check your solution.

$$x^2 - 6x - 9 = 18$$

Original equation

$$x^2 - 6x - 27 = 0$$

Subtract 18 from each side.

$$(x + 3)(x - 9) = 0$$

Factor the trinomial.

$$x + 3 = 0 \text{ or } x - 9 = 0$$

Zero Product Property

$$x = -3 \quad x = 9$$

Solve.

Example 4 Factor a Trinomial Where a is Not 1

Solve $3x^2 + 5x + 15 = 17$ by factoring. Check your solution.

$$3x^2 + 5x + 15 = 17$$

Original equation

$$3x^2 + 5x - 2 = 0$$

Subtract 17 from each side.

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

Factor the trinomial.

$$3x - 1 = 0 \text{ or } x + 2 = 0$$

Zero Product Property

$$x = \frac{1}{3} \quad x = -2$$

Solve.

Check

Solve $4x^2 + 12x - 27 = 13$ by factoring. Check your solution.

$$x = \underline{\quad ? \quad}, \underline{\quad ? \quad}$$

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الأسئلة الموضوعية - MCQ			
4	Complete the square in quadratic expressions to solve quadratic equations.	Example 4	35

Lesson 1-5 Solving Quadratic Equations by Completing the Square

Example 4 Complete the Square

Find the value of c that makes $x^2 - 7x + c$ a perfect square. Then write the expression as a perfect square trinomial.

Step 1 Find one half of -7 . $\frac{-7}{2} = -3.5$

Step 2 Square the result from Step 1. $(-3.5)^2 = 12.25$

Step 3 Add the result from Step 2 to $x^2 - 7x$. $x^2 - 7x + 12.25$

The expression $x^2 - 7x + 12.25$ can be written as $(x - 3.5)^2$.

الأسئلة الموضوعية - MCQ			
5	Complete the square in quadratic expressions to solve quadratic equations.	Example 5	35

Lesson 1-5 Solving Quadratic Equations by Completing the Square

Example 5 Solve by Completing the Square

Solve $x^2 + 18x - 4 = 0$ by completing the square.

$$x^2 + 18x - 4 = 0$$

Original equation

$$x^2 + 18x = 4$$

Add 4 to each side.

$$x^2 + 18x + 81 = 4 + 81$$

Add $\left(\frac{b}{2}\right)^2$ to each side.

$$(x + 9)^2 = 85$$

Factor.

$$x + 9 = \pm\sqrt{85}$$

Square Root Property

$$x = -9 \pm \sqrt{85}$$

Subtract 9 from each side.

$$x = -9 + \sqrt{85} \text{ or}$$

Write as two equations.

$$x = -9 - \sqrt{85}$$

$$x \approx 0.22, \text{ or } -18.22$$

Simplify.

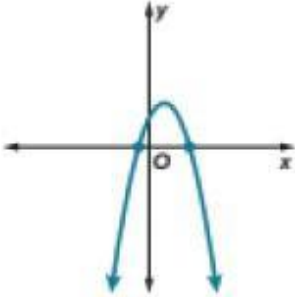
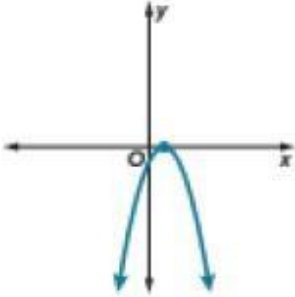
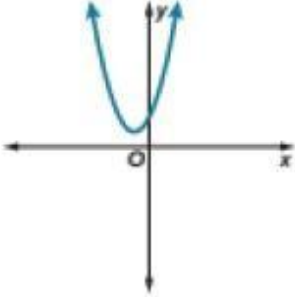
The solution set is $\{x \mid x = -9 - \sqrt{85}, -9 + \sqrt{85}\}$.

الأسئلة الموضوعية - MCQ			
6	Determine the number and type of roots of a quadratic equation.	Key Concept • Discriminant	45

Lesson 1-6 Using the Quadratic Formula and the Discriminant

Learn Using the Discriminant

In the Quadratic Formula, the **discriminant** is the expression under the radical sign, $b^2 - 4ac$. The value of the discriminant can be used to determine the number and type of roots of a quadratic equation.

Key Concept • Discriminant		
Consider $ax^2 + bx + c = 0$, where a , b , and c are rational numbers and $a \neq 0$.		
Value of Discriminant	Type and Number of Roots	Example of Graph of Related Function
$b^2 - 4ac > 0$; $b^2 - 4ac$ is a perfect square.	2 real, rational roots	
$b^2 - 4ac > 0$; $b^2 - 4ac$ is not a perfect square.	2 real, irrational roots	
$b^2 - 4ac = 0$	1 real rational root	
$b^2 - 4ac < 0$	2 complex roots	

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الأسئلة الموضوعية - MCQ			
7	Graph quadratic inequalities in two variables.	(4-9) & (37-39)	55 & 56

Lesson 1-7 Quadratic Inequalities

Examples 1 and 2

Graph each inequality.

4. $y \leq x^2 + 4$

5. $y < 2x^2 - 4x - 2$

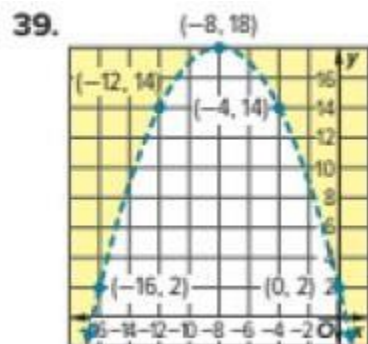
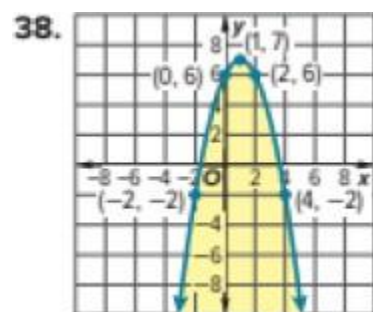
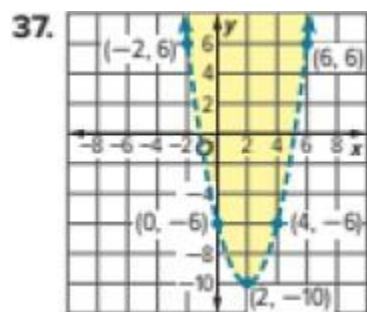
6. $-x^2 + 12x - 36 > y$

7. $y > x^2 + 6x + 7$

8. $y > x^2 - 8x + 17$

9. $y \geq x^2 + 2x + 2$

Write a quadratic inequality for each graph.



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8	Graph and analyze polynomial functions.	Example 3	75

Lesson 2-1

Polynomial Functions

Example 3 Degrees and Leading Coefficients

State the degree and leading coefficient of each polynomial in one variable. If it is not a polynomial in one variable, explain why.

a. $2x^4 - 3x^3 - 4x^2 - 5x + 6a$ degree: 4 leading coefficient: 2

b. $7x^3 - 2$ degree: 3 leading coefficient: 7

c. $4x^2 - 2xy + 8y^2$ This is not a polynomial in one variable. There are two variables, x and y .

d. $x^5 + 12x^4 - 3x^3 + 2x^2 + 8x + 4$ degree: 5 leading coefficient: 1

Check

Select the degree and leading coefficient of $11x^3 + 5x^2 - 7x - \frac{6}{x}$.

A. degree: 3, leading coefficient: 11

B. degree: 11, leading coefficient: 3

C. This is not a polynomial in one variable. There are two variables, x and y .

D. This is not a polynomial in one variable. The term $\frac{6}{x}$ has the variable with an exponent less than 0.

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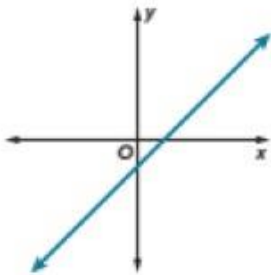
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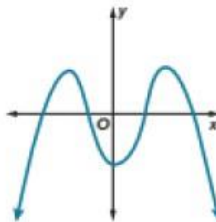
9	Graph and analyze polynomial functions.	(15-20)	80
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Lesson 2-1**Polynomial Functions****Example 5****Use the graph to state the number of real zeros of the function.**

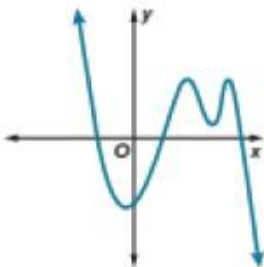
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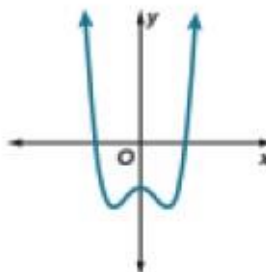
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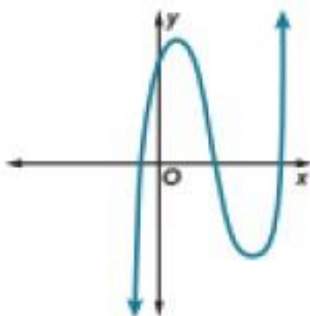
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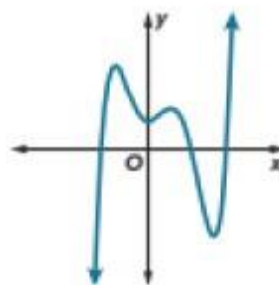
18.



19.



20.



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10	Approximate zeros by graphing polynomial functions.	Example1	83
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Lesson 2-2 Analyzing Graphs of Polynomial Functions

Example 1 Locate Zeros of a Function

Determine the consecutive integer values of x between which each real zero of $f(x) = x^4 - 2x^3 - x^2 + 1$ is located. Then draw the graph.

Step 1 Make a table.

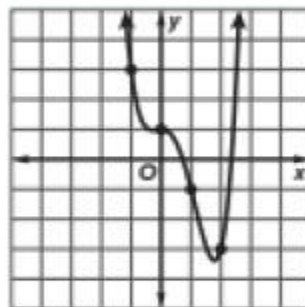
Because $f(x)$ is a fourth-degree polynomial, it will have as many as 4 real zeros or none at all.

x	-2	-1	0	1	2	3	4
$f(x)$	29	3	1	-1	-3	19	113

Using the Location Principle, there are zeros between $x = 0$ and $x = 1$ and between $x = 2$ and $x = 3$.

Step 2 Sketch the graph.

Use the table to sketch the graph and find the locations of the zeros.



Check

Use technology to check the location of the zeros.

Input the function into a graphing calculator to confirm that the function crosses the x -axis between $x = 0$ and $x = 1$ and between $x = 2$ and $x = 3$.

You can find more accurate values of the zeros by using the **zero** feature in the CALC menu to find $x \approx 0.7213$ and $x \approx 2.3486$, which confirms the estimates.

Check

Determine the consecutive integer values of x between which each real zero of $f(x) = 2x^4 + x^3 - 3x^2 - 2$ is located. Then draw the graph.

$x = \underline{\quad ? \quad}$ and $x = \underline{\quad ? \quad}$

$x = \underline{\quad ? \quad}$ and $x = \underline{\quad ? \quad}$

11	Find extrema of polynomial functions.	Example2	84
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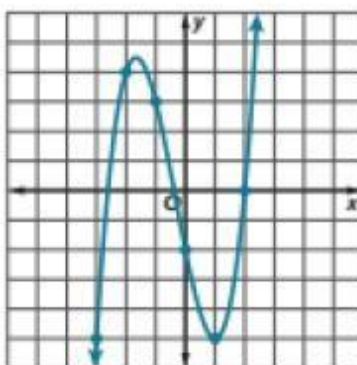
Lesson 2-2 Analyzing Graphs of Polynomial Functions

Example 2 Identify Extrema

Use a table to graph $f(x) = x^3 + x^2 - 5x - 2$. Estimate the x -coordinates at which the relative maxima and relative minima occur.

Step 1 Make a table of values and graph the function.

x	$f(x)$
-4	-30
-3	-5
-2	4
-1	3
0	-2
1	-5
2	0
3	19



Step 2 Estimate the locations of the extrema.

The value of $f(x)$ at $x = -2$ is greater than the surrounding points indicating a maximum *near* $x = -2$.

The value of $f(x)$ at $x = 1$ is less than the surrounding points indicating a minimum *near* $x = 1$.

You can use a graphing calculator to find the extrema of a function and confirm your estimates.

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Check

Copy and complete the table for $f(x) = -x^4 - x^3 + 5x^2 + x - 3$ to estimate the x -coordinates at which the relative maxima and relative minima occur.

x	$f(x)$
-3	
-2	
-1	
0	
1	
2	
3	

The relative maxima occur near $x = \underline{\quad ? \quad}$ and $x = \underline{\quad ? \quad}$.

The relative minimum occurs near $x = \underline{\quad ? \quad}$.

MCQ - الأسئلة الموضوعية

12	Add and subtract polynomials.	Example 2 & Example 3	94
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Lesson 2-3**Operations with Polynomials****Example 2 Add Polynomials**

Find $(6x^3 + 7x^2 - 2x + 5) + (x^3 - 4x^2 - 8x + 1)$.

Method 1 Add horizontally.

Group and combine like terms.

$$\begin{aligned}
 &(6x^3 + 7x^2 - 2x + 5) + (x^3 - 4x^2 - 8x + 1) \\
 &= (6x^3 + x^3) + (7x^2 - 4x^2) + (-2x - 8x) + (5 + 1) \quad \text{Group like terms.} \\
 &= 7x^3 + 3x^2 - 10x + 6 \quad \text{Combine like terms.}
 \end{aligned}$$

Method 2 Add vertically.

Align like terms vertically and add.

$$\begin{array}{r}
 6x^3 + 7x^2 - 2x + 5 \\
 (+) x^3 - 4x^2 - 8x + 1 \\
 \hline
 7x^3 + 3x^2 - 10x + 6
 \end{array}$$

Align like terms.
Combine like terms.

Check

Find $(2x^3 + 9x^2 + 6x - 3) + (4x^3 - 7x^2 + 5x)$.

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Example 3 Subtract PolynomialsFind $(2x^5 + 11x^4 + 7x - 8) - (5x^4 + 9x^3 - 3x + 4)$.**Method 1 Subtract horizontally.**

Group and combine like terms.

$$(2x^5 + 11x^4 + 7x - 8) - (5x^4 + 9x^3 - 3x + 4)$$

$$= 2x^5 + 11x^4 + 7x - 8 - 5x^4 - 9x^3 + 3x - 4$$

Original equation

Distribute -1 .

$$= 2x^5 + (11x^4 - 5x^4) + (-9x^3) + (7x + 3x) + (-8 - 4)$$

Group like terms.

$$= 2x^5 + 6x^4 - 9x^3 + 10x - 12$$

Combine like terms.

Method 2 Subtract vertically.

Align like terms vertically and subtract.

$$\begin{array}{r} 2x^5 + 11x^4 + 0x^3 + 7x - 8 \\ (-) 0x^5 + 5x^4 + 9x^3 - 3x + 4 \\ \hline 2x^5 + 6x^4 - 9x^3 + 10x - 12 \end{array}$$

CheckFind $(8x^2 - 3x + 1) - (5x^3 + 2x^2 - 6x - 9)$.

MCQ - الأسئلة الموضوعية

13	Multiply polynomials.	(16-26)	97
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Lesson 2-3**Operations with Polynomials****Multiply.**

16. $x^2(2x + 9)$

17. $(a - 5)^2$

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18. $(2x - 3)(3x - 5)$

19. $(x - y)(x^2 + 2xy + y^2)$

20. $(a + b)(a^3 - 3ab - b^2)$

21. $(x - y)(x + y)(2x + y)$

22. $(a + b)(2a + 3b)(2x - y)$

23. $(r - 2t)(r + 2t)$

24. $(3y + 4)(2y - 3)$

25. $(x^3 - 3x^2 + 1)(2x^2 - x + 2)$

26. $(4x^5 + x^3 - 7x^2 + 2)(3x - 1)$

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الأسئلة الموضوعية - MCQ			
14	Divide polynomials by using long division.	Example 1 & Example 2 & Example 3	102

Lesson 2-4**Dividing Polynomials****Example 1** Divide a Polynomial by a MonomialFind $(24a^4b^3 + 18a^2b^2 - 30ab^3)(6ab)^{-1}$.

$$(24a^4b^3 + 18a^2b^2 - 30ab^3)(6ab)^{-1}$$

$$= \frac{24a^4b^3 + 18a^2b^2 - 30ab^3}{6ab}$$

Write a fraction.

$$= \frac{24a^4b^3}{6ab} + \frac{18a^2b^2}{6ab} - \frac{30ab^3}{6ab}$$

Sum of quotients

$$= \frac{24}{6}a^{4-1}b^{3-1} + \frac{18}{6}a^{2-1}b^{2-1} - \frac{30}{6}a^{1-1}b^{3-1}$$

Divide.

$$= 4a^3b^2 + 3ab - 5b^2$$

Simplify.

CheckFind $(9x^3y^5 + 21x^4y^4 - 12x^3y^2) \div (3x^2y^2)$.**Example 2** Divide a Polynomial by a BinomialFind $(x^2 - 5x - 36) \div (x + 4)$.

$$\begin{array}{r} x - 9 \\ x + 4 \overline{) x^2 - 5x - 36} \end{array}$$

$$\underline{(-) x^2 + 4x}$$

$$-9x - 36$$

$$\underline{(-) -9x - 36}$$

$$0$$

The quotient is $x - 9$ and the remainder is 0.**Check**Find $\frac{x^2 + 6x - 112}{x - 8}$.

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Example 3 Find a Quotient with a RemainderFind $\frac{3z^3 - 14z^2 - 7z + 3}{z - 5}$.

$$\begin{array}{r}
 3z^2 + z - 2 \\
 z - 5 \overline{) 3z^3 - 14z^2 - 7z + 3} \\
 \underline{(-) 3z^3 - 15z^2} \\
 z^2 - 7z \\
 \underline{(-) z^2 - 5z} \\
 -2z + 3 \\
 \underline{(-) -2z + 10} \\
 -7
 \end{array}$$

The quotient is $3z^2 + z - 2$ and the remainder is -7 .Therefore, $\frac{3z^3 - 14z^2 - 7z + 3}{z - 5} = 3z^2 + z - 2 - \frac{7}{z - 5}$.**Check**Find the quotient of $(-4x^3 + 5x^2 - 2x - 9)(x - 2)^{-1}$.

15	Solve polynomial equations by writing them in quadratic form and factoring.	Example 6 , Example 7 & (16-27)	126 & 128
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Lesson 3-2

Solving Polynomial Equations Algebraically

Example 6 Write Expressions in Quadratic Form

Write each expression in quadratic form, if possible.

a. $4x^{20} + 6x^{10} + 15$

Examine the terms with variables to choose the expression equal to u .

$$4x^{20} + 6x^{10} + 15 = (2x^{10})^2 + 3(2x^{10}) + 15 \quad (2x^{10})^2 = 4x^{20}$$

b. $18x^4 + 180x^8 - 28$

If the polynomial is not already in standard form, rewrite it. Then examine the terms with variables to choose the expression equal to u .

$$\begin{aligned} 18x^4 + 180x^8 - 28 &= 180x^8 + 18x^4 - 28 \\ &= 5(6x^4)^2 + 3(6x^4) - 28 \end{aligned} \quad \begin{array}{l} \text{Standard form} \\ \text{of a polynomial} \\ (6x^4)^2 = 36x^8 \end{array}$$

c. $9x^6 - 4x^2 - 12$

Because $x^6 \neq (x^2)^2$, the expression cannot be written in quadratic form.

Check

What is the quadratic form of $10x^4 + 100x^8 - 9$?

Example 7 Solve Equations in Quadratic Form

Solve $8x^4 + 10x^2 - 12 = 0$.

$$8x^4 + 10x^2 - 12 = 0 \quad \text{Original equation}$$

$$2(2x^2)^2 + 5(2x^2) - 12 = 0 \quad 2(2x^2)^2 = 8x^4$$

$$2u^2 + 5u - 12 = 0 \quad \text{Let } u = 2x^2.$$

$$(2u - 3)(u + 4) = 0 \quad \text{Factor.}$$

$$u = \frac{3}{2} \text{ or } u = -4 \quad \text{Zero Product Property}$$

$$2x^2 = \frac{3}{2} \quad 2x^2 = -4 \quad \text{Replace } u \text{ with } 2x^2.$$

$$x^2 = \frac{3}{4} \quad x^2 = -2 \quad \text{Divide each side by 2.}$$

$$x = \pm \frac{\sqrt{3}}{2} \quad x = \pm i\sqrt{2} \quad \text{Take the square root of each side.}$$

The solutions are $\frac{\sqrt{3}}{2}$, $-\frac{\sqrt{3}}{2}$, $i\sqrt{2}$, and $-i\sqrt{2}$.

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CheckWhat are the solutions of $16x^4 + 24x^2 - 40 = 0$?

$x = \underline{\quad ? \quad}$

Write each expression in quadratic form, if possible.

16. $x^4 + 12x^2 - 8$

17. $-15x^4 + 18x^2 - 4$

18. $8x^6 + 6x^3 + 7$

19. $5x^6 - 2x^2 + 8$

20. $9x^8 - 21x^4 + 12$

21. $16x^{10} + 2x^5 + 6$

Solve each equation.

22. $x^4 + 6x^2 + 5 = 0$

23. $x^4 - 3x^2 - 10 = 0$

24. $4x^4 - 14x^2 + 12 = 0$

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25. $9x^4 - 27x^2 + 20 = 0$

26. $4x^4 - 5x^2 - 6 = 0$

27. $24x^4 + 14x^2 - 3 = 0$

الأسئلة الموضوعية - MCQ

16 Graph exponential growth functions.

Example 1 & Example 2

217 & 218

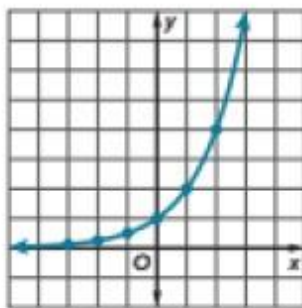
Lesson 5-1 Graphing Exponential Functions

Example 1 Graph Exponential Growth Functions

Graph $f(x) = 2^x$. Find the domain, range, y -intercept, asymptote, and end behavior.

Make a table of values. Then plot the points and sketch the graph.

x	$f(x) = 2^x$
-3	0.125
-2	0.25
-1	0.5
0	1
1	2
2	4
3	8



domain: all real numbers

range: all positive real numbers

 y -intercept: (0, 1)asymptote: $y = 0$ end behavior: As $x \rightarrow -\infty$, $f(x) \rightarrow 0$ and as $x \rightarrow \infty$, $f(x) \rightarrow \infty$.

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Example 2 Graph Transformations of Exponential Growth Functions

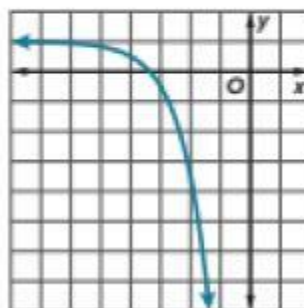
Graph $g(x) = -\frac{1}{2} \cdot 3^{x+4} + 1$.

Transform the graph of $g(x) = 3^x$.

$a = -\frac{1}{2}$; Reflect in the x-axis and compress vertically.

$h = -4$; Translate 4 units left.

$k = 1$; Translate 1 unit up.



MCQ - الأسئلة الموضوعية

17 Graph exponential decay functions.

Example 6 & Example 7

219 & 220

Lesson 5-1

Graphing Exponential Functions

Example 6 Graph Exponential Decay Functions

Graph $f(x) = \left(\frac{1}{2}\right)^x$. Find the domain, range, y-intercept, asymptote, and end behavior.

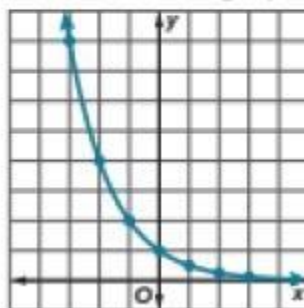
Make a table of values. Then plot the points and sketch the graph.

domain: all real numbers

range: all positive real numbers

y-intercept: (0, 1) asymptote: $y = 0$

end behavior: as $x \rightarrow -\infty$, $f(x) \rightarrow \infty$ and as $x \rightarrow \infty$, $f(x) \rightarrow 0$



Example 7 Graph Transformations of Exponential Decay Functions

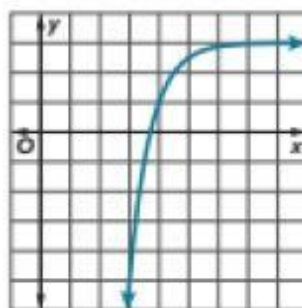
Graph $g(x) = -2\left(\frac{1}{4}\right)^{x-4} + 3$.

$g(x)$ is a transformation of $f(x) = \left(\frac{1}{4}\right)^x$.

$a = -2$; Reflect in the x-axis and stretch vertically.

$h = 4$; Translate 4 units right.

$k = 3$; Translate 3 units up.



الأسئلة الموضوعية - MCQ			
18	Distinguish among sample surveys, experiments, and observational studies.	Example 4 & (11-14)	373 & 376

Lesson 8-1

Random Sampling

 Example 4 Classify Study Types

UNIFORMS A research team wants to test new football uniform designs and their appeal to young adults. They randomly select 100 young adults to view the different uniforms. The research team observes and records the reactions to the uniforms.

Step 1 What is the purpose of the study?

The purpose is to determine if the new uniforms will be appealing to young adults.

Step 2 Does this situation represent a *survey*, an *experiment*, or an *observational study*?

This is a(n) observational study because the participants are observed without being affected by the study.

Step 3 Identify the sample and population.

The sample is the 100 young adults involved in the study. The population is all young adults.

Check

Match each study subject with the corresponding study type that should be used.

_____? A principal wants to determine the favorite after-school activity of his students.

A. observational study

_____? A researcher wants to determine whether young adults would be interested in a new line of smartwatches entering the market.

B. census

C. survey

_____? A teacher wants to determine whether bright colors affect the test-taking abilities of high school students.

D. experiment

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Determine whether each situation describes a survey, an experiment, or an observational study. Then identify the sample, and suggest a population from which it may have been selected.

11. An Internet service provider conducts an online study in which customers are randomly selected and asked to provide feedback on their customer service.
12. A research group randomly selects 100 business owners, half of whom started their own businesses, and compares their success.
13. A research group randomly chooses 50 people to participate in a study to determine whether exercising regularly reduces the risk of diabetes in adults.
14. An online video streaming service mails a questionnaire to randomly selected people across the country to determine whether they prefer streaming movies or sports.

MCQ - الأسئلة الموضوعية			
19	Classify sampling methods and identify bias in samples and survey questions.	Example3 & (7-10)	372 &375

Lesson 8-1 Random Sampling

Example 3 Identify Biased Questions

FOOD A restaurant owner wants to determine which kinds of meals she should add to her menu: vegetarian options or more traditional meat-based dishes. She releases a survey to her customers asking the following question: *Do you prefer a plain salad or a delicious steak?* Identify any bias in the question.

Step 1 Identify the purpose of the question. The purpose is to determine which dishes are most popular with customers.

Step 2 Identify the bias in the sample. The question provides descriptions of each kind of food, and the description for the steak favors it over the salad.

Identify each sample or question as *biased* or *unbiased*. Explain your reasoning.

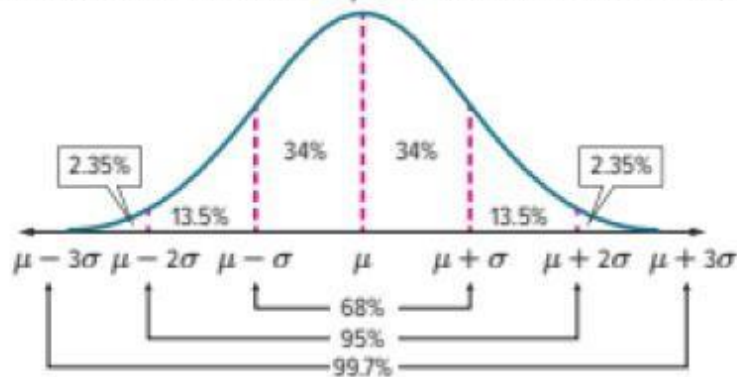
7. Do you think that the workout facility needs a new treadmill and racquetball court?
8. Which is your favorite type of music, pop, or country?
9. Are you a member of any after-school clubs?
10. Don't you agree that employees should pack their lunch?

الأسئلة الموضوعية - MCQ			
20	Analyze normally distributed variables by using the Empirical Rule.	Key Concept • The Empirical Rule	396

Lesson 8-4 Normal Distributions

Key Concept • The Empirical Rule

In a normal distribution with mean μ and standard deviation σ ,



- approximately 68% of the data fall within 1σ of the mean,
- approximately 95% of the data fall within 2σ of the mean, and
- approximately 99.7% of the data fall within 3σ of the mean.

When a set of data is *not* approximately normal, it cannot be represented by the Empirical Rule. Skewed data is one example of a set of data that is not approximately normal.



The data are normally distributed, symmetric about the mean, and bell-shaped.



The data are approximately normally distributed. The data can be modeled by the normal distribution.



The data are skewed to the left. A normal curve would not be the best curve to model the distribution.

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الأسئلة المقالية - FRQ			
21	Solve quadratic equations by using the Quadratic Formula.	(1-6,12,13)	47

Lesson 1-6 Using the Quadratic Formula and the Discriminant**Solve each equation by using the Quadratic Formula.**

1. $x^2 + 8x + 15 = 0$

2. $x^2 - 18x + 72 = 0$

3. $12x^2 - 22x + 6 = 0$

4. $4x^2 - 6x = -2$

5. $x^2 + 8x + 5 = 0$

6. $-8x^2 + 4x = -5$

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Solve each equation by using the Quadratic Formula.

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

13. $8x^2 + 5x - 1 = 0$

الأسئلة المقالية - FRQ

22	Divide polynomials by using synthetic division.	Example 4 & Example 5	103 & 104
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Lesson 2-4

Dividing Polynomials

Example 4 Use Synthetic DivisionFind $(3x^3 - 2x^2 - 53x - 60) \div (x + 3)$.

Step 1 Write the coefficients of the dividend and write the constant a in the box. Because $x + 3 = x - (-3)$, $a = -3$. Then bring the first coefficient down.

$$\begin{array}{r|rrrrr} -3 & 3 & -2 & -53 & -60 & \\ & \downarrow & & & & \\ & 3 & & & & \end{array}$$

Step 2 Multiply by a and write the product. The product of the coefficient and a is $3(-3) = -9$.

$$\begin{array}{r|rrrrr} -3 & 3 & -2 & -53 & -60 & \\ & & -9 & & & \\ \hline & 3 & & & & \end{array}$$

Step 3 Add the product and the coefficient.

$$\begin{array}{r|rrrrr} -3 & 3 & -2 & -53 & -60 & \\ & & -9 & & & \\ \hline & 3 & -11 & & & \end{array}$$

Step 4 Repeat Steps 2 and 3 until you reach a sum in the last column.

$$\begin{array}{r|rrrrr} -3 & 3 & -2 & -53 & -60 & \\ & & -9 & 33 & 60 & \\ \hline & 3 & -11 & -20 & 0 & \end{array}$$

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Step 5 Write the quotient. Because the degree of the dividend is 3 and the degree of the divisor is 1, the degree of the quotient is 2. The final sum in the synthetic division is 0, so the remainder is 0.

The quotient is $3x^2 - 11x - 20$.

Example 5 Divisor with a Coefficient Other Than 1

Find $\frac{4x^4 - 37x^2 + 4x + 9}{2x - 1}$.

To use synthetic division, the lead coefficient of the divisor must be 1.

$$\frac{(4x^4 - 37x^2 + 4x + 9) \div 2}{(2x - 1) \div 2}$$

Divide the numerator and denominator by 2.

$$= \frac{2x^4 - \frac{37}{2}x^2 + 2x + \frac{9}{2}}{x - \frac{1}{2}}$$

Simplify the numerator and denominator.

$$x - a = x - \frac{1}{2}, \text{ so } a = \frac{1}{2}.$$

Complete the synthetic division.

$\frac{1}{2}$	2	0	$-\frac{37}{2}$	2	$\frac{9}{2}$
		1	$\frac{1}{2}$	-9	$-\frac{7}{2}$
	2	1	-18	-7	1

The resulting expression is $2x^3 + x^2 - 18x - 7 + \frac{1}{x - \frac{1}{2}}$.

Now simplify the fraction.

$$\frac{1}{x - \frac{1}{2}} = \frac{(1)^2}{\left(x - \frac{1}{2}\right) \cdot 2}$$

Multiply the numerator and denominator by 2.

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

Simplify.

The solution is $2x^3 + x^2 - 18x - 7 + \frac{2}{2x - 1}$.

Student Name:

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CheckFind $(4x^4 + 3x^3 - 12x^2 - x + 6)(4x + 3)^{-1}$.

الأسئلة المقالية - FRQ

23	Solve polynomial equations by factoring.	(1-10)	127
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Lesson 3-2**Solving Polynomial Equations Algebraically****Factor completely. If the polynomial is not factorable, write *prime*.**

1. $8c^3 - 27d^3$

2. $64x^4 + xy^3$

3. $a^8 - a^2b^6$

4. $x^6y^3 + y^9$

5. $18x^6 + 5y^6$

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6. $w^3 - 2y^3$

7. $gx^2 - 3hx^2 - 6fy^2 - gy^2 + 6fx^2 + 3hy^2$

8. $12ax^2 - 20cy^2 - 18bx^2 - 10ay^2 + 15by^2 + 24cx^2$

9. $a^3x^2 - 16a^3x + 64a^3 - b^3x^2 + 16b^3x - 64b^3$

10. $8x^5 - 25y^3 + 80x^4 - x^2y^3 + 200x^3 - 10xy^3$

الأسئلة المقالية - FRQ

24	Solve exponential equations in one variable.	(1-6)	229
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Lesson 5-2

Solving Exponential Equations and Inequalities

Solve each equation.

1. $25^{2x+3} = 25^{5x-9}$

2. $9^{8x-4} = 81^{3x+6}$

3. $4^{x-5} = 16^{2x-31}$

4. $4^{3x-3} = 8^{4x-4}$

5. $9^{-x+5} = 27^{6x-10}$

6. $125^{3x-4} = 25^{4x+2}$

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الأسئلة المقالية - FRQ			
25	(a,b) Analyze standardized data and distributions by using z-values. (The table will be provided in the question)	Example 8 & 14	400 & 402

Lesson 8-4 Normal Distributions

 **Example 8** Find Area Under the Standard Normal Curve by Using a Calculator

INTERNET TRAFFIC The number of daily hits to a local news Web site is normally distributed with $\mu = 98,452$ hits and $\sigma = 10,325$ hits. Find the probability that the Web site will get at least 100,000 hits on a given day, $P(X > 100,000)$.



Student Name:

Date:

Step 1 Find the corresponding z-value for $X = 100,000$.

$$z = \frac{X - \mu}{\sigma}$$

Formula for z-value

$$z = \frac{100,000 - 98,452}{10,325}$$

 $X = 100,000$, $\mu = 98,452$, and $\sigma = 10,325$

$$z \approx 0.150$$

Simplify.

Step 2 Find the probability.The area under the curve when $z > 4$ is negligible.

So $z = 4$ can be used as an upper bound for finding area. You can use a graphing calculator to find the area between $z = 0.150$ and $z = 4$.

Press **2nd** **[DISTR]** and select **normalcdf**. Enter the interval and press **enter** to display the area.

```
normalcdf(0.150,
4)
.4403506010
```

The area is 0.44. Therefore, the probability of the Web site getting at least 100,000 hits in one day is 44.0%.

Check

CUSTOMER SERVICE The length of time that a customer spends waiting to be connected to a customer service representative is normally distributed with a mean of 21.3 seconds and a standard deviation of 3.8 seconds. Find the probability that a wait time will be greater than 30 seconds. %.

14. TESTING The scores on a test administered to prospective employees are normally distributed with a mean of 100 and a standard deviation of 12.3.

- What percent of the scores are between 70 and 80?
- What percent of the scores are over 115?
- If 75 people take the test, how many would you expect to score lower than 75?