هيكل اختبار نهاية الفصل



تم تحميل هذا الملف من موقع المناهج الإماراتية	
موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف الثامن ⇦ رياضيات ⇦ الفصل الأول ⇦ ملفات متنوعة ⇦ الملف	
تاريخ إضافة الملف على موقع المناهج: 2026-11-15 13:49:56	
ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس	المزيد من مادة رياضيات:
إعداد: مدرسة الشيم	

التواصل الاجتماعي بحسب الصف الثامن					
صفحة المناهج الإماراتية على فيسبوك					
المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات	

المزيد من الملفات بحسب الصف الثامن والمادة رياضيات في الفصل الأول	
هيكل مراجعة وأسئلة تدريبية	1
عرض بوربوينت ملزمة هيكل ريفيل ثامن عام	2
عرض بوربوينت ملزمة هيكل ريفيل ثامن متقدم الجزء الورقي	3
عرض بوربوينت ملزمة هيكل ريفيل ثامن متقدم	4
حل تغطية اختبار نهاية الفصل - أسئلة تدريبية - ثامن متقدم	5

تحميل تطبيق المناهج للهواتف الذكية	
تطبيق المناهج على Store App (آبل)	تطبيق المناهج على Play Google (أندرويد)

Alshyiam School C2 & 3

Math Department

EOT Coverage Term 1

2006-2007

Gr-8 GEN

Done by:
Laila Alrashedi

School Principal:
Noura AlGaithi

UNITED ARAB EMIRATES
MINISTRY OF EDUCATION

الإمارات العربية المتحدة
وزارة التربية والتعليم

End of Term 1 Exam Coverage	هيكل اختبار نهاية الفصل الدراسي الأول
Grade 8 General - Mathematics	**الصف الثامن - عام - الرياضيات**
Academic Year 2026-2027	العام الدراسي 2026-2027
Reveal	ريفيل

عدد الأسئلة Number of questions	درجة السؤال Marks per question	الدرجة القصوى الممكنة Maximum overall grade
26	**MCQ (2-4)** **FRQ (5-8)**	**100**

مدة الاختبار Exam duration	طريقة التطبيق Mode of implementation	الآلة الحاسبة Calculator
150 دقيقة **150 minutes**	**إلكتروني وورقي** **Electronic & Paper**	**يُمنع استخدام الآلة الحاسبة** **The use of a calculator is not allowed**

almanahj.com/ae
2026 2025
موقع المناهج الإماراتية

EOT T1 Exam Coverage Grade 8 GEN 2026-2027

Unit	Lesson	Q #	Learning outcomes	Exercise	page
1	L1.1 Powers and exponents	Q2 Q22	Use integer exponents to show repeated multiplication of rational numbers	1&2 (اختيار من متعدد) 5-9 (كتابي - مقالي)	11
	L1.2 Multiply and Divide Monomials	Q3 Q4	Use the Laws of Exponents to multiply and divide monomials with common bases	1-4 (اختيار من متعدد) 5-8 (اختيار من متعدد)	23
	L1.3 Powers of Monomials	Q5	Use the Power of a Power Property and the Power of a Product Property to simplify expressions with integer exponents	1-6 (اختيار من متعدد)	31
	L1.4 Zero and Negative Exponents	Q21	Use the Zero Exponent Rule and the Quotient of Powers Property to simplify expressions with zero and negative integer exponents	3-10 (كتابي - مقالي)	41
	L1.5 Scientific Notation	Q6	Write very large and very small numbers using scientific notation	1-6 (اختيار من متعدد)	53
	L1.6 ملغي				

almanahj.com/ae 2026 2025 موقع المناهج الإماراتية

EOT T1 Exam Coverage Grade 8 GEN 2026-2027

2	L2.1 Terminating and Repeating decimals	Q1	Show how the decimal form of a rational number of repeats eventually	1-4 (اختيار من متعدد)	77
	L2.2 Roots	Q8 Q7	-Find square and cube roots -Use square and cube roots to solve equations involving perfect squares and cubes	1-7 (اختيار من متعدد) 8-10 (اختيار من متعدد)	89
	L2.3 Real Numbers	Q9	Identify irrational numbers and name the set(s) of real numbers to which a given real number belongs	1-11 (اختيار من متعدد)	99
	L2.4 Estimate irrational numbers	Q23	Estimate irrational numbers by approximating their locations on a number line or by truncating their decimal expansions	1-8 (كتابي - مقالي)	109
	L2.5 Compare and order real numbers	Q20	Use rational approximations to compare and order real numbers, including irrational numbers	1-7 (كتابي- مقالي)	121

almanahj.com/ae
2026 2025
موقع المناهج الإماراتية

EOT T1 Exam Coverage Grade 8 GEN 2026-2027

3	L3.1 Solve equations with variables on each sides	Q24	Use the properties of equality to solve equations with variables on each side that have rational coefficients	1-8 (كتابي - مقالي)	135
	L3.2 Write and solve equations with variables both sides	Q14	Write linear equations in one variable with rational coefficients and use the properties of equality to solve them	1-4 (اختيار من متعدد)	143
	L3.3 Solve multi-step equations	Q 10	Solve multi-step linear equations with rational coefficients by using the Distributive Property and combining like terms	1-4 (اختيار من متعدد)	149
	L3.4 Write and solve multi-step equations	Q11	Write and solve multi-step linear equations with rational coefficients by using the Distributive Property and combining like terms	Example 1 (اختيار من متعدد) Example 2 (اختيار من متعدد)	152 153

EOT T1 Exam Coverage Grade 8 GEN 2026-2027

	L4.1 Proportional relationships and slope	Q15	Graph and compare proportional relationships using words, equations, and tables and interpret the unit rate as the slope of the line	1 and 2 (اختيار من متعدد)	189
	L 4.2 Slope of the line	Q16		Learn (اختيار من متعدد)	191 192
4		Q17	Identify the slope of a line and interpret it as the rate of change within the context of the problem	(اختيار من 1-6 متعدد)	203
	L4.3 ملغي				
	L4.4 Direct variation	Q26	Derive the equation y = mx from the slope formula and use direct variation equations to represent and solve real-world and mathematical problems	Learn (كتابي- مقالي) 1-4 (كتابي - مقالي)	213 223
	L4.5 Slope intercept form	Q18 Q 25	Write equations of the form y = mx + b when given a table, graph, or verbal description	1-6 (اختيار من متعدد) 1-7 (كتابي – مقالي)	235 235
	L4.6 Graph linear equations	Q19	Interpret the slope and y-intercept of a line from an equation of the form y = mx + b in order to graph the line on the coordinate plane	1-6 (كتابي – مقالي)	245



Alshyiam School C2 & 3

Math Department

Unit 1

Done by:
Laila Alrashedi

School Principal:
Noura AlGaithi

A

ZERO EXPONENT RULE

for $a \neq 0$

$$a^0 = 1$$



Exponents

Exponents represent **repeated multiplication.**

$$2^3 = 2 \times 2 \times 2$$

exponent (or power)

base

2 multiplied by itself 3 times

Power Rule for Exponents

$$(x^a)^b = x^{ab}$$

Example: $(2^2)^3 = 2^{2 \cdot 3} = 2^6 = 64$

EXPONENT RULES EXPLAINED!!

POWER TO POWER

$$(4^2)^5 \quad 4^2 \cdot 4^2 \cdot 4^2 \cdot 4^2 \cdot 4^2$$

$$(x^a)^b = x^{ab}$$

Product Rule for Exponent

$$a^m \cdot a^n = a^{m+n}$$

$$x^1 = x$$



Quotient Rule for Exponents

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

Example: $\frac{2^5}{2^3} = 2^{5-3} = 2^2 = 4$





Raising a Product to a Power

$$(xy)^a = x^a y^a$$

Example: $(3z)^2 = 3^2 \cdot z^2 = 9z^2$

EXPONENT RULES EXPLAINED!!

PRODUCT TO A POWER

$$(\bullet\bullet\bullet)^{\bullet} \quad \begin{matrix}\bullet\bullet\bullet \\ \bullet\bullet\bullet\end{matrix}$$

$$(2xy^3)^4 \quad 2^4 x^4 y^{3 \cdot 4} = 16x^4y^{12}$$

Raising a Product to a Power

$$(xy)^a = x^a y^a$$

Example: $(3z)^2 = 3^2 \cdot z^2 = 9z^2$

EXPONENT RULES EXPLAINED!!

PRODUCT TO A POWER

$$(\bullet\bullet\bullet)^a = \bullet^a\bullet^a\bullet^a$$

$$(2xy^3)^4 = 2^4 x^4 y^{12} = 16x^4y^{12}$$



Scientific Notation ⇒ Standard Form

Ex 1: $4.5 \times 10^3 \Rightarrow 4,500 \Rightarrow 4,500$

Ex 2: $2.8 \times 10^{-4} \Rightarrow .00028 \Rightarrow .00028$

☆ Did You Notice ☆

If b is positive you move the decimal to the right to get a bigger number

If b is negative you move the decimal to the left to get a smaller number

Standard From ⇒ Scientific Notation

Ex 1: $536,000 \Rightarrow 5.36000 \Rightarrow 5.36000 \Rightarrow 5.36 \times 10^5$

Ex 2: $.00407 \Rightarrow 004.07 \Rightarrow 004.07 \Rightarrow 4.07 \times 10^{-3}$

Practice..

Write each expression using exponents. (Examples 1 and 2)

1. $(-7) \cdot (-7) \cdot 5 \cdot 5 \cdot 5 \cdot 5 =$ _____

$$(-7)^2 \cdot 5^4$$

2. $n \cdot n \cdot p \cdot p \cdot r \cdot r \cdot r =$ _____

ANSWER:
$n_2 \cdot p_2 \cdot r_3$

5. Evaluate $x^3 - y^2$ if $x = 2$ and $y = \frac{5}{4}$. (Example 4)

$x_3 - y_2$ Write the expression.
$= 2_3 - (\ )_2$ Replace x with 2 and y with .
$= 8 -$ Evaluate the powers.
= Subtract.

6. Evaluate $(g + h)^3$ if $g = 2$ and $h = -3$. (Example 5)

$(g + h)_3$ Write the expression.
$= [2 + (-3)]_3$ Replace g with 2 and h with -3.
$= [-1]_3$ Add.
$= -1$ Evaluate the power.

7. Replace ☐ with <, >, or = to make a true statement: $(-3)^4$ ☐ $(-4)^3$.

Evaluate $(-3)^4$.
$(-3)^4 = (-3) \cdot (-3) \cdot (-3) \cdot (-3)$
$= 81$
Evaluate $(-4)^3$.
$(-4)^3 = (-4) \cdot (-4) \cdot (-4)$
$= -64$
Compare 81 and –64. Because 81 is greater than –64, $(-3)^4 > (-4)^3$.

8. A scientist estimates that, after a certain amount of time, there would be $2^5 \cdot 3^3 \cdot 10^5$ bacteria in a Petri dish. How many bacteria is this?

$2^5 \cdot 3^3 \cdot 10^5$ Write the expression.
$= 32 \cdot 27 \cdot 100{,}000$ Evaluate the powers.
$= 86{,}400{,}000$ Multiply.
So, there will be 86,400,000 bacteria in the Petri dish.

Test Practice

9. Multiselect Select all of the expressions that evaluate to negative rational numbers.

- ☐ $(-9)^4$ = 6561
- ☐ $\left(-\frac{4}{5}\right)^3 = -\frac{64}{125}$
- ☐ $3^5 - 10^4$ 243 − 10000 = −9,757
- ☐ $(9.8)^2 - 10^2$
- ☐ $\left(-\frac{3}{8}\right)^2 - \frac{3^2}{8^2} = \frac{9}{64}$

Practice..

PG. 23

Simplify each expression. (Examples 1–3)

1. $3^8 \cdot 3 =$

SOLUTION:

$3^8 \cdot 3$	Write the expression.
$= 3^8 \cdot 3^1$	$3 = 3^1$
$= 3^{8+1}$	Product of Powers Property
$= 3^9$ or 19,683	Add the exponents. Simplify.

2. $m^5 \cdot m^2 =$ _____

SOLUTION:

$m^5 \cdot m^2$	Write the expression.
$= m^{5+2}$	Product of Powers Property
$= m^7$	Simplify.

3. $3m^3n^2 \cdot 8mn^3 =$

SOLUTION:

$$3m^3n^2 \cdot 8mn^3$$
$$= (3 \cdot m^3 \cdot n^2) \cdot (8 \cdot m \cdot n^3)$$
$$= (3 \cdot 8)(m^3 \cdot m)(n^2 \cdot n^3)$$
$$= 24(m^3 \cdot m)(n^2 \cdot n^3)$$
$$= 24(m^{3+1})(n^{2+3})$$
$$= 24m^4n^5$$

4. $9p^4 \cdot (-8p^2) =$ _____

$$9p^4 \cdot (-8p^2)$$
$$= (9 \cdot p^4) \cdot (-8 \cdot p^2)$$
$$= (9 \cdot -8)(p^4 \cdot p^2)$$
$$= -72(p^4 \cdot p^2)$$
$$= -72p^{4+2}$$
$$= -72p^6$$

Practice..

PG. 23-

Simplify each expression. (Examples 1–3)

5. Simplify $\frac{b^{12}}{b^5}$. (Example 4)

$$= b^{12-5}$$
$$= b^7$$

6. Simplify $\frac{5^5 \cdot 6^3 \cdot 8^{10}}{5^3 \cdot 6 \cdot 8^9}$. (Example 6)

$$= \left(\frac{5^5}{5^3}\right)\left(\frac{6^3}{6}\right)\left(\frac{8^{10}}{8^9}\right)$$
$$= 5^{5-3} \cdot 6^{3-1} \cdot 8^{10-9}$$
$$= 5^2 \cdot 6^2 \cdot 8^1$$
$$= 25 \cdot 36 \cdot 8$$
$$= 7{,}200$$

7. A publisher sells 10^6 copies of a new science fiction book and 10^3 copies of a new mystery book. How many times as many science fiction books were sold than mystery books? (Example 5)

Evaluate $\frac{10^6}{10^3}$.

$$\frac{10^6}{10^3}$$
$$= 10^{6-3}$$
$$= 10^3$$
$$= 1{,}000$$

8. Simplify $\frac{45x^{15}}{9x^{10}}$. (Example 7)

$$= \left(\frac{45}{9}\right)\left(\frac{x^{15}}{x^{10}}\right)$$
$$= 5\left(\frac{x^{15}}{x^{10}}\right)$$
$$= 5(x^{15-10})$$
$$= 5x^5$$

Test Practice

9. Equation Editor Simplify $\frac{a^4c^6}{a^2c}$.



$$= \left(\frac{a^4}{a^2}\right)\left(\frac{c^6}{c}\right)$$
$$= (a^{4-2})(c^{6-1})$$
$$= a^2c^5$$

Practice..

Simplify each expression. (Examples 1–4)

1. $(7^2)^3 =$

$= 7^{2 \cdot 3}$

$= 7^6$ or 117,649

2. $(8^3)^3 =$

$(8^3)^3$

$= 8^{3 \cdot 3}$

$= 8^9$ or 134,217,728

3. $(d^7)^6 =$

$= d^{7 \cdot 6}$

$= d^{42}$

4. $(z^7)^3 =$

$= z^{7 \cdot 3}$

$= z^{21}$

5. $(2m^5)^6 =$

$= 2^6 \cdot (m^5)^6$

$= 2^6 \cdot m^{5 \cdot 6}$

$= 64m^{30}$

6. $(7a^5b^6)^4 =$

$= 7^4 \cdot (a^5)^4 \cdot (b^6)^4$

$= 7^4 \cdot a^{5 \cdot 4} \cdot b^{6 \cdot 4}$

$= 2{,}401a^{20}b^{24}$

7. $(-3w^3z^8)^5 =$

$= (-3)^5 \cdot (w^3)^5 \cdot (z^8)^5$

$= (-3)^5 \cdot w^{3 \cdot 5} \cdot z^{8 \cdot 5}$

$= -243w^{15}z^{40}$

8. $(-5r^4s^{10})^4 =$

$= (-5)^4 \cdot (r^4)^4 \cdot (s^{10})^4$

$= (-5)^4 \cdot r^{4 \cdot 4} \cdot s^{10 \cdot 4}$

$= 625r^{16}s^{40}$

Practice..

PG. 41

Simplify each expression. (Example 1)

1. $46^0 =$ $46^0 = 1$

2. w^0, where $w \neq 0$ 1

Express each using a positive exponent.

(Example 2)

3. $8^{-4} =$ $= \frac{1}{8^4}$

4. $y^{-9} =$ $\frac{1}{y^9}$

Express each fraction using a negative exponent. (Example 3)

5. $\frac{1}{d^6} =$ d^{-6}

6. $\frac{1}{10^5} =$ 10^{-5}

almanahj.com/ae 2026 2025 موقع المناهج الإماراتية

PG. 41

Simplify each expression. (Examples 4 and 5)

7. $9^4 \cdot 9^{-6} =$

$= 9^{4+(-6)}$

$= 9^{-2}$

$= \frac{1}{9^2}$

$= \frac{1}{81}$

8. $y^{-9} \cdot y^3 =$

y^{-9+3}

$= y^{-6}$

$\frac{1}{y^6}$

9. $\frac{x^{-8}}{x^{-12}} =$

$= x^{(-8)-(-12)}$

$= x^4$

10. $\frac{d^{-13}}{d^{-2}} =$

$= d^{(-13)-(-2)}$

$= d^{-11}$

$= \frac{1}{d^{11}}$

Test Practice

Practice..

PG. 53

Write each number in standard form. (Examples 1 and 2)

1. $1.6 \times 10^3 =$ $= 1{,}600$

2. $1.49 \times 10^{-7} =$ $= 0.000000149$

3. A calculator screen shows a number in scientific notation as 8.3E−6. Write this number in standard form. (Example 3)

$= 8.3 \times 10^{-6}$
$= 0.0000083$

4. A calculator screen shows a number in scientific notation as 7E11. Write this number in standard form. (Example 3)

$= 7 \times 10^{11}$
$= 700{,}000{,}000{,}000$

Write each number in scientific notation. (Examples 4 and 5)

5. $2{,}204{,}000{,}000$

$= 2.204 \times 1{,}000{,}000{,}000$
$= 2.204 \times 10^9$

6. $0.0000000642 =$

$= 6.42 \times 0.00000001$
$= 6.42 \times \frac{1}{10^8}$
$= 6.42 \times 10^{-8}$

Alshyiam School C2 & 3

Math Department

Unit 2

Done by:
Laila Alrashedi

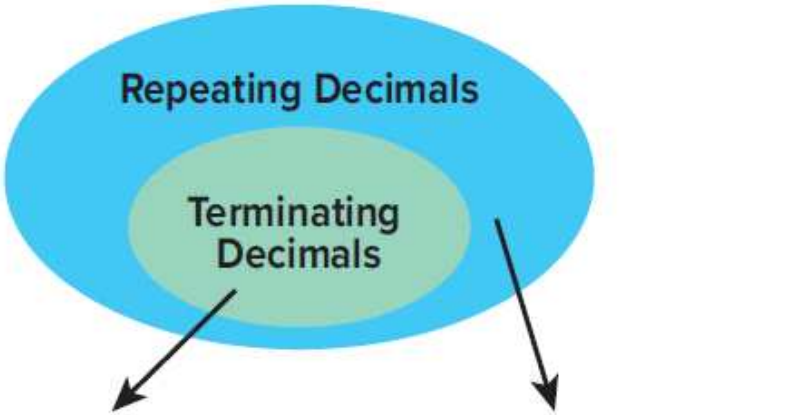
School Principal:
Noura AlGaithi

Rational Number	Repeating Decimal	Terminating Decimal
$\frac{2}{5}$	0.400...	0.4
$\frac{5}{6}$	0.833... $0.8\overline{3}$	does not terminate

Write each decimal from the list below in the correct box.

0.64000..., $0.\overline{56}$, 0.4242...,

0.84, 0.333..., 0.7



Terminates in Zeros	Does Not Terminate in Zeros
0.64000. . . 0.84 0.7	$0.\overline{56}$ 0.4242. . . 0.333. . .

Practice..

Write each rational number in decimal form. Then determine whether the decimal is a terminating decimal. (Examples 1 and 2)

PG. 77

1. $-\frac{11}{16} =$ ____

$-\frac{11}{16}$ means $-11 \div 16$. Divide 11 by 16 and add the negative sign.

Place the decimal point. Annex zeros and divide as with whole numbers.

$$
\begin{array}{r}
.6875 \\
16\overline{)11.0000} \\
-96 \\
\hline
140 \\
-128 \\
\hline
120 \\
-112 \\
\hline
80 \\
-80 \\
\hline
0
\end{array}
$$

-0.6875; terminating

$-\frac{11}{16} = -0.6875$

2. $\frac{5}{33} =$ ____

$\frac{5}{33}$ means $5 \div 33$. Divide 5 by 33.

Place the decimal point. Annex zeros and divide as with whole numbers.

$$
\begin{array}{r}
.1515\ldots \\
33\overline{)5.0000} \\
-33 \\
\hline
170 \\
-165 \\
\hline
50 \\
-33 \\
\hline
170 \\
-165 \\
\hline
5
\end{array}
$$

not terminating

$\frac{5}{33} = 0.\overline{15}$

So, $0.\overline{15}$ is not a terminating decimal because the repeating digit is not zero.

3. $4\frac{3}{8} =$ ____

$4\frac{3}{8}$ can be rewritten as $\frac{35}{8}$. Divide 35 by 8.

$$
\begin{array}{r}
4.375 \\
8\overline{)35.000} \\
-32 \\
\hline
30 \\
-24 \\
\hline
60 \\
-56 \\
\hline
40 \\
-40 \\
\hline
0
\end{array}
$$

terminating

$4\frac{3}{8} = 4.375$

4. $-9\frac{11}{30} =$ ____

$-9\frac{11}{30}$ can be rewritten as $-\frac{281}{30}$. Divide 281 by 30 and add a negative sign.

$$
\begin{array}{r}
9.366\ldots \\
30\overline{)281.000} \\
-270 \\
\hline
110 \\
-90 \\
\hline
200 \\
-180 \\
\hline
200 \\
-180 \\
\hline
20
\end{array}
$$

not terminating

Practice..

PG. 89

Simplify using rational numbers. If the expression cannot be simplified, explain why. (Examples 1–4)

square

19 x19

1. $\sqrt{361} =$ $\sqrt{361} = 19$

1.4 x1.4

2. $\pm\sqrt{1.96} =$ 1.4×1.4 equal 2. $= 1.96$

So, $\pm\sqrt{1.96} = \pm 1.4$

square root

3. $-\sqrt{\frac{9}{16}} = -\frac{3}{4}$

4. $\sqrt{-441} =$ The expression cannot be simplified. -441.

4 = .2 x.2

5. Solve $m^2 = 0.04$. (Example 5)

$\pm\sqrt{m} = \pm\sqrt{0.04}$

$m = \pm 0.2$

$m = 0.2$ and $m = -0.2$

cubi

7. $\sqrt[3]{-512} =$ _____

$\sqrt[3]{-512} = -8$ $(-8)^3 = -8 \cdot -8 \cdot -8$ or -512

8.8.8

Simplify using rational numbers. (Examples 6 and 7)

6. $\sqrt[3]{343} =$ $\sqrt[3]{343} = 7$ $7^3 = 7 \cdot 7 \cdot 7$ or 343

almanahj.com/ae 2026 2025

PG. 89

8. A basin of a water fountain is cube shaped and has a volume of 91.125 cubic feet. Solve $s^3 = 91.125$ to find the length s of one side of the basin. (Example 8)

Convert 91.125 to $\frac{729}{8}$.

$s^3 = \frac{729}{8}$	Write the equation.
$\sqrt[3]{s} = \sqrt[3]{\frac{729}{8}}$	Take the cube root of each side.
$s = \frac{9}{2}$	Definition of cube root
$s = 4\frac{1}{2}$ or 4.5	Simplify.

9. Moesha has 196 pepper plants that she wants to plant in a square formation. How many pepper plants should she plant in each row?

Find the square root of 196.

$\sqrt{196} = 14$ Find the positive square root of 196; $14^2 = 196$.

Test Practice

10. Equation Editor What is the value of p in the equation shown?

$p^3 = -0.027$



$$p^3 = -0.027$$
$$\sqrt[3]{p} = \sqrt[3]{-0.027}$$
$$p = -0.3$$

Practice..

PG.99

Identify whether each number is *rational* or *irrational*. (Example 1)

1. $-\sqrt{10}$ — irrational — not perfect root

2. $-\frac{3}{11}$ — rational — $\frac{a}{b}$

3. $0.\overline{3}$ — rational — R.D.

4. $\sqrt{81}$ — rational — $9=$

5. 0 — rational

6. $-\frac{\sqrt{2}}{2}$ — irrational — not P.R

7. $\sqrt{7}$ — irrational — not perfect root

8. $\frac{\sqrt{2}}{\sqrt{2}} = 1$ — rational

almanahj.com/ae

PG.99

Select all the sets of numbers to which each real number belongs. (Examples 2–4)

9. $\sqrt[3]{343} = 7$

- (A) Rational
- (B) Irrational
- (C) Integer
- (D) Whole
- (E) Natural

Rational, Integer, Whole, Natural

10. $\frac{7}{\sqrt{2}}$ → not P.R

- (A) Rational
- (B) Irrational
- (C) Integer
- (D) Whole
- (E) Natural

Irrational

11. $-\frac{7}{1} = -7$

- (A) Rational
- (B) Irrational
- (C) Integer
- (D) Whole + ,0
- (E) Natural ١، ٠ ...

Rational, Integer

almanahj.com/ae 2026 2025 موقع المناهج الإماراتية

Practice..

PG.109

Estimate each square root or cube root to the nearest integer. (Examples 1 and 3)

1. $\sqrt{125} \approx$ 11

2. $\sqrt{55} \approx$ _____

Because 55 is closer to 49, you can expect $\sqrt{55}$ to be closer to 7 than 8. So, $\sqrt{55} \approx 7$.

Estimate each square root or cube root to the nearest integer. (Examples 1 and 3)

3. $\sqrt[3]{70} \approx$ _____

Because 70 is closer to 64, you can expect $\sqrt[3]{70}$ to be closer to 4 than 5. So, $\sqrt[3]{70} \approx 4$.

4. $\sqrt[3]{923} \approx$ _____

Because 923 is closer to 1,000, you can expect $\sqrt[3]{923}$ to be closer to 10 than 9. So, $\sqrt[3]{923} \approx 10$.

$\sqrt{4} < \sqrt{5} < \sqrt{9}$

2 3

2.1^2

$2.2^2 = 4.84$

2.3^2

Estimate each square root to the nearest tenth. (Example 2)

5. $\sqrt{296} \approx \sqrt{295.84} \approx 17.2$

$17.1^2 =$ 17.3^2

$\sqrt{296}$ is between 17.2 and 17.3. 296 is closer to 295.84 than 299.29. So, $\sqrt{296} \approx 17.2$.

$\sqrt{9}$ $\sqrt{11}$ $\sqrt{16}$

3 4

6. $\sqrt{5} \approx$ _____

$\sqrt{5}$ is between 2.2 and 2.3. 5 is closer to 4.84 than 5.29. So , $\sqrt{5} \approx 2.2$.

3 2

$\sqrt{49}$ $\sqrt{62}$ $\sqrt{64}$

7 8

7. $\sqrt{11} \approx$ _____

$3.3^2 =$

$\sqrt{11}$ is between 3.3 and 3.4. 11 is closer to 10.89 than 11.56. So, $\sqrt{11} \approx 3.3$

8. $\sqrt{62} \approx$ _____

$\sqrt{62}$ is between 7.8 and 7.9. 62 is closer to 62.14 than 60.84. So, $\sqrt{62} \approx 7.9$.

7.8 , 7.9

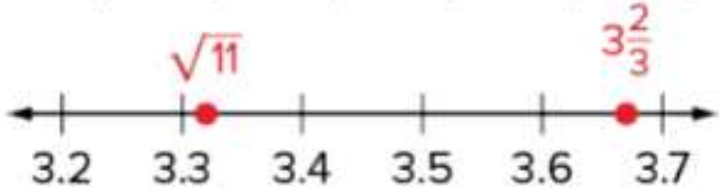
Practice.. PG.121

Complete each statement using <, >, or =. Then graph the numbers on the number line. (Examples 1 and 2)

1. $\sqrt{11}$ ___ $3\frac{2}{3}$

$\sqrt{11} = 3.3166\ldots$

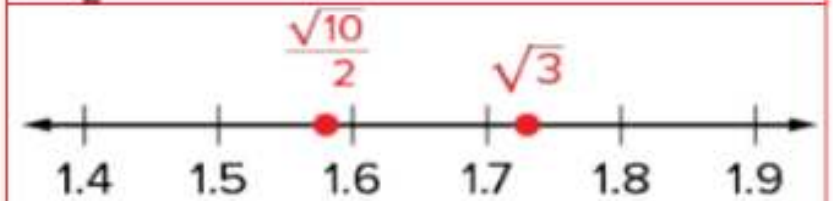
$3\frac{2}{3} = 3.6666\ldots$



2. $\sqrt{3}$ ___ $\frac{\sqrt{10}}{2}$

$\sqrt{3} \approx 1.7$ Estimate to the nearest tenth.

$\frac{\sqrt{10}}{2} \approx 1.6$ Estimate to the nearest tenth.

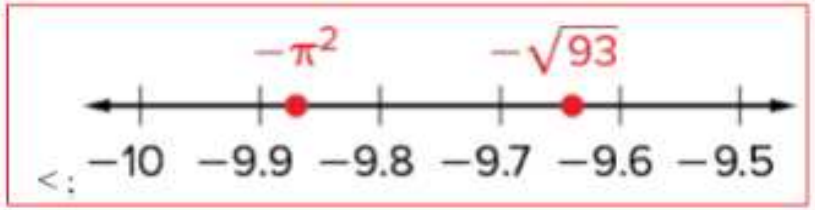


3. $-\pi^2$ ___ $-\sqrt{93}$

$-\pi^2 \approx -9.9$ Estimate to the nearest tenth.

$-\sqrt{93} \approx -9.6$ Estimate to the nearest tenth.

Since -9.6 is greater than -9.9, $-\pi^2 < -\sqrt{93}$.

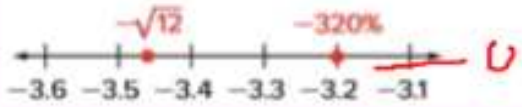


4. $-\sqrt{12}$ ___ -320%

$-\sqrt{12} = -3.4482\ldots$

$-320\% = -3.2$

Approximate the location of each number. Then plot their location on the number line.



Practice.. PG.121

5. Order the set $\left\{3\frac{1}{2}, \frac{10}{3}, \pi, \sqrt{13}\right\}$ from least to greatest. Then graph the set on the number line. (Example 3)

$3\frac{1}{2} = 3.5$ (3) Write as a decimal.

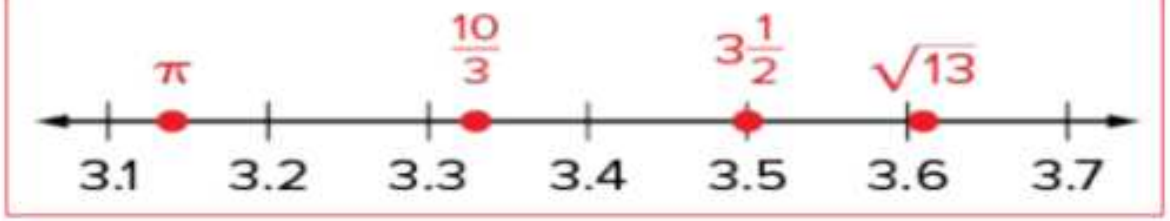
$\frac{10}{3} \approx 3.\bar{3}$ (2) Write using bar notation.

$\pi \approx 3.1$ (1) Estimate to the nearest tenth.

$\sqrt{13} \approx 3.6$ (4) Estimate to the nearest tenth.

Compare the decimals. The decimals from least to greatest are 3.1, $3.\bar{3}$, 3.5, and 3.6.

So, from least to greatest, the order is π, $\frac{10}{3}$, $3\frac{1}{2}$, and $\sqrt{13}$.



3.5
(2) 3.3
(1) 3.1
3.6

$\frac{1}{3} = 0.\bar{3}$

$\frac{2}{3} = 0.\bar{6}$

6. The table shows the foul-shot statistics for three players in a recent basketball game. Which player had the greatest foul-shot statistic? (Example 4)

Player	Foul-Shot Statistic
1	$\frac{7}{9} = 0.\bar{7}$
2	$\frac{72\%}{100} = 0.72$
3	8 out of 10

Player 3

$\frac{8}{10} = 0.80$

$\frac{7}{9} \approx 0.\bar{7}$

72% = 0.72

8 out of 10 = 0.8

Test Practice

7. Multiple Choice Select the symbol that makes the sentence true.

$\sqrt{27}$ ___ $\frac{\sqrt{95}}{2}$

5.2 > 4.9

Ⓐ <

Ⓑ >

Ⓒ =

Ⓓ ≤

$\sqrt{27} \approx 5.2$

$\frac{\sqrt{95}}{2} \approx 4.9$



Alshyiam School C2 & 3

Math Department

Unit 3

Done by:
Laila Alrashedi

School Principal:
Noura AlGaithi

Practice..

Solve each equation. Check your solution. (Examples 1–3)

PG.135

1. $-2a - 9 = 6a + 15$

$$-2a - 9 = 6a + 15$$
$$-6a \quad -6a$$
$$-8a - 9 = 15$$
$$+9 \quad +9$$
$$-8a = 24$$
$$\frac{-8a}{-8} = \frac{24}{-8}$$
$$a = -3$$

2. $14 + 3n = 5n - 6$

$$14 + 3n = 5n - 6$$
$$-5n \quad -5n$$
$$14 - 2n = -6$$
$$-14 \quad -14$$
$$-2n = -20$$
$$\frac{-2n}{-2} = \frac{-20}{-2}$$
$$n = 10$$

3. $\frac{1}{2}x - 5 = 10 - \frac{3}{4}x$

$x = 12$

4. $\frac{2}{3}y + 1 = \frac{1}{6}y + 8$

$y = 14$

almanahj.com/ae 2026 2025 موقع المناهج الإماراتية

Solve each equation. Check your solution. (Examples 1–3)

PG.135

5. $5.4p + 13.1 = -2.6p + 3.5$

$$
\begin{aligned}
5.4p + 13.1 &= -2.6p + 3.5 \\
+2.6p & \qquad +2.6p \\
8p + 13.1 &= 3.5 \\
-13.1 & \quad -13.1 \\
8p &= -9.6 \\
\frac{8p}{8} &= \frac{-9.6}{8} \\
p &= -1.2
\end{aligned}
$$

6. $0.15w + 0.35 = 0.22w - 0.14$

$$
\begin{aligned}
0.15w + 0.35 &= 0.22w - 0.14 \\
-0.22w & \qquad -0.22w \\
-0.07w + 0.35 &= -0.14 \\
-0.35 & \quad -0.35 \\
-0.07w &= -0.49 \\
\frac{-0.07w}{-0.07} &= \frac{-0.49}{-0.07} \\
w &= 7
\end{aligned}
$$

7. Twelve more than seven times a number equals the number less six. Solve the equation $7x + 12 = x - 6$ to find the number, x.

$$
\begin{aligned}
7x + 12 &= x - 6 \\
-x & \qquad -x \\
6x + 12 &= -6 \\
-12 & \quad -12 \\
6x &= -18 \\
\frac{6x}{6} &= \frac{-18}{6} \\
x &= -3
\end{aligned}
$$

Test Practice

8. Equation Editor Solve the equation shown for x.

$3x - 15 = 17 - x$

$$
\begin{aligned}
3x - 15 &= 17 - x \\
+x & \qquad +x \\
4x - 15 &= 17 \\
+15 & \quad +15 \\
4x &= 32 \\
\frac{4x}{4} &= \frac{32}{4} \\
x &= 8
\end{aligned}
$$

Practice..

PG.143

1. Marko has 45 comic books in his collection, and Tamara has 61 comic books. Marko buys 4 new comic books each month and Tamara buys 2 comic books each month. After how many months will Marko and Tamara have the same number of comic books?

Solve the equation $45 + 4m = 61 + 2m$.

$45 + 4m = 61 + 2m$	Write the equation.
$-2m \quad -2m$	Subtraction Property of Equality
$45 + 2m = 61$	Simplify.
$-45 \quad -45$	Subtraction Property of Equality
$2m = 16$	Simplify.
$\frac{2m}{2} = \frac{16}{2}$	Division Property of Equality
$m = 8$	Simplify.

They will have the same number of comic books after 8 months.

2. A fish tank has 150 gallons of water and is being drained at a rate of $\frac{1}{2}$ gallon each second. A second fish tank has 120 gallons of water and is being filled at a rate of $\frac{1}{4}$ gallon each second. After how many seconds will the two fish tanks have the same amount of water?

Fish Tank 1	Fish Tank 2

$$150 - \frac{1}{2}s = 120 + \frac{1}{4}s$$

$$150 - \frac{1}{2}s = 120 + \frac{1}{4}s$$

$$-\frac{1}{4}s \qquad -\frac{1}{4}s$$

$$150 - \frac{3}{4}s = 120$$

$$-150 \qquad -150$$

$$-\frac{3}{4}s = -30$$

$$\left(-\frac{4}{3}\right)-\frac{3}{4}s = -30\left(-\frac{4}{3}\right)$$

$$s = 40$$

PG.143

3. Shipping Company A charges $14 plus $2.25 a pound to ship overnight packages. Shipping Company B charges $20 plus $1.50 a pound to ship an overnight package. For what weight is the charge the same for the two companies?

Let p = the number of pounds.

Write an equation that models when they will have the same cost.

Company A Company B

$$14 + 2.25p = 20 + 1.5p$$

Solve the equation $14 + 2.25p = 20 + 1.5p$.

$14 + 2.25p = 20 + 1.5p$	Write the equation.
$-1.5p \quad -1.5p$	Subtraction Property of Equality
$14 + 0.75p = 20$	Simplify.
$-14 \quad -14$	Subtraction Property of Equality
$0.75p = 6$	Simplify.
$\frac{0.75p}{0.75} = \frac{6}{0.75}$	Division Property of Equality
$p = 8$	Simplify.

PG.143

4. A bicycle rental company charges a $20 fee plus $5.50 per hour to rent a bicycle. Another bicycle rental company charges a $15 fee plus $6.50 per hour to rent a bicycle. For what number of hours is the cost for the rental the same?

Write an equation that models when they will have the same cost.

Bicycle Company 1 Bicycle Company 2

$$20 + 5.50h = 15 + 6.50h$$

Solve the equation $20 + 5.50h = 15 + 6.50h$.

$20 + 5.50h = 15 + 6.50h$	Write the equation.
$-6.50h \quad -6.50h$	Subtraction Property of Equality
$20 - h = 15$	Simplify.
$-20 \quad -20$	Subtraction Property of Equality
$-h = -5$	Simplify.
$\frac{-h}{-1} = \frac{-5}{-1}$	Division Property of Equality
$h = 5$	Simplify.

They will have the same cost at 5 hours.

Solve each equation. Check your solution.

Practice.. PG.149

1. $-g + 2(3 + g) = -4(g + 1)$

$$-g + 2(3 + g) = -4(g + 1)$$
$$-g + 6 + 2g = -4g - 4$$
$$g + 6 = -4g - 4$$
$$+4g \quad +4g$$
$$5g + 6 = -4$$
$$-6 \quad -6$$
$$5g = -10$$
$$\frac{5g}{5} = \frac{-10}{5}$$
$$g = -2$$

2. $-8 - x = -3(2x - 4) + 3x$

$$-8 - x = -3(2x - 4) + 3x$$
$$-8 - x = -6x + 12 + 3x$$
$$-8 - x = -3x + 12$$
$$+3x \quad +3x$$
$$-8 + 2x = 12$$
$$+8 \quad +8$$
$$2x = 20$$
$$\frac{2x}{2} = \frac{20}{2}$$
$$x = 10$$

3. $0.6(4 - 2x) = 20.5 - (3x + 10)$

$$0.6(4 - 2x) = 20.5 - (3x + 10)$$
$$2.4 - 1.2x = 20.5 - 3x - 10$$
$$2.4 - 1.2x = 10.5 - 3x$$
$$+3x \quad +3x$$
$$2.4 + 1.8x = 10.5$$
$$-2.4 \quad -2.4$$
$$1.8x = 8.1$$
$$\frac{1.8x}{1.8} = \frac{8.1}{8.1}$$
$$x = 4.5$$

4. $12 - (4y + 8) = 0.5(8y - 16)$

$$12 - (4y + 8) = 0.5(8y - 16)$$
$$12 - 4y - 8 = 4y - 8$$
$$4 - 4y = 4y - 8$$
$$-4y \quad -4y$$
$$4 + -8y = -8$$
$$-4 \quad -4$$
$$-8y = -12$$
$$\frac{-8y}{-8} = \frac{-12}{-8}$$
$$y = 1.5 = \frac{3}{2}$$

almanahj.com/ae

StudyTip

Modeling When writing an expression to model a situation, begin by identifying the important quantities and their relationships.

2 Write Algebraic Expressions

Another important skill is translating verbal expressions into algebraic expressions.

KeyConcept Translating Verbal to Algebraic Expressions

Operation		Verbal Phrases
Addition	+	more than, sum, plus, increased by, added to , and **, filling**
Subtraction	−	less than, subtracted from, difference, decreased by, minus **, draining**
Multiplication	×	product of, multiplied by, times, of ,Per , each
Division	÷	quotient of, divided by
Equal to (=)		is , same as



almanahj.com/ae 2026 2025 موقع المناهج الإماراتية

PG.152-153

Example 1 Write and Solve Multi-Step Equations

Mrs. Hill is designing a rectangular vegetable garden for her backyard. The width of the garden is $11\frac{1}{2}$ feet shorter than twice its length.

If the perimeter of the garden is 37 feet, what is the length of the garden? Write and solve an equation. Check your solution.

Part A Write an equation.

Let ℓ represent the length, in feet, of the garden. The width of the garden is twice the length minus $11\frac{1}{2}$ feet. So, the expression $2\ell - 11\frac{1}{2}$ represents the width of the garden.

Write an equation that models the perimeter.

$$P = 2\ell + 2w$$

$$37 = 2\ell + 2\left(2\ell - 11\frac{1}{2}\right)$$

Part B Solve the equation.

$37 = 2\ell + 2\left(2\ell - 11\frac{1}{2}\right)$	Write the equation.
$37 = 2\ell + 4\ell - 23$	Distributive Property
$37 = 6\ell - 23$	Combine like terms.
$+23 = \quad +23$	Addition Property of Equality
$60 = 6\ell$	Simplify.
$\frac{60}{6} = \frac{6\ell}{6}$	Division Property of Equality
$10 = \ell$	Simplify.

So, the length of the garden is 10 feet.

Check the solution.

Length: 10 feet

Width: $2\ell - 11\frac{1}{2} = 2(10) - 11\frac{1}{2}$ or 8.5 feet

Perimeter: $2\ell - 2w = 2(10) + 2(8.5)$ or 37 feet

PG.152-153

Check

The hallway in Oscar's house is in the shape of a rectangle. The length of the hallway is $\frac{1}{2}$ foot longer than twice its width. The perimeter of the hallway is 31 feet.

Part A

Which equation(s) can be used to find the width w of the hallway? Select all that apply.

- ☐ $31 = \frac{1}{2} + 4w$
- ☑ $31 = 1 + 6w$
- ☐ $31 = 2 + 2w$
- ☑ $31 = 2\left(\frac{1}{2} + 2w\right) + 2w$
- ☐ $31 = \frac{1}{2} + 2w$
- ☑ $31 = 2\left(\frac{1}{2} + 3w\right)$

Part B

What is the width of the hallway?

Show your work here

5 feet

almanahj.com/ae 2026 2025

PG.152-153

PG.153

Example 2 Write and Solve Multi-Step Equations

Mr. Murphy's class of 20 students is going on a field trip to the science center. They will also watch the 3-D movie. Mrs. Todd's class of 15 students is going on a field trip to the art museum and will take the audio tour. Admission to the art museum is 2.5 times that of the science center's entry fee, as shown in the table.

If the total cost is the same at both the science center and the art museum, what is the entry fee per student to the science center? Check your solution.

Science Center	Art Museum
Entry fee: $x per student	Admission: $2.5x per student
3-D movie: $2.50 per student	Audio Tour: $1 per student

Part A Write an equation.

$20(x + 2.50) = 15(2.5x + 1)$

$20x + 50 = 37.5x + 15$

$-20 \quad -20$

$50 = 17.5x + 15$

$-15 \quad -15$

$\frac{35}{17.5} = \frac{17.5x}{17.5}$

$2 = x$

$\frac{350}{175} = \frac{35 \times 10}{17.5 \times 10}$

PG.152-153

Check

A group of 6 friends went to a basketball tournament game. They each bought a ticket for x dollars and spent $8.50 each on snacks. Another group of 4 friends went to the championship game and paid twice as much for each of their tickets as the first group. The group of 4 friends also spent $6.50 each on snacks.

Part A

Which equation can be used to find the cost of each ticket for the group of 6 friends?

- ○ $8.50(x + 6) = 4(2x + 6.50)$
- ○ $6(x + 8.50) = 2(4x + 6.50)$
- ○ $8.50(x + 6) = 6.50(2x + 4)$
- D $6(x + 8.50) = 4(2x + 6.50)$

Part B

What is the cost of each ticket for the group of 6 friends?

almanahj.com/ae

Practice..

Write and solve an equation for each exercise. Check your solution.

PG.157

1. Mr. Reed is drawing a blueprint of a rectangular patio. The width of the patio is $40\frac{3}{4}$ feet shorter than twice its length. The perimeter of the patio is $86\frac{1}{2}$ feet. What is the length of the patio?

Let ℓ represent the length in feet of the garden.

The width is $40\frac{3}{4}$ feet shorter than twice its length: $w = 2\ell - 40\frac{3}{4}$

Write an equation that models the perimeter.

$P = 2\ell + 2w$ Write the equation.

$86\frac{1}{2} = 2\ell + 2\left(2\ell - 40\frac{3}{4}\right)$ Replace P with $86\frac{1}{2}$ and w with $2\ell - 40\frac{3}{4}$.

Solve the equation $86\frac{1}{2} = 2\ell + 2\left(2\ell - 40\frac{3}{4}\right)$.

$86\frac{1}{2} = 2\ell + 2\left(2\ell - 40\frac{3}{4}\right)$ Write the equation.

$86\frac{1}{2} = 2\ell + 4\ell - 81\frac{1}{2}$ Distributive Property

$86\frac{1}{2} = 6\ell - 81\frac{1}{2}$ Combine like terms.

$+ 81\frac{1}{2} \quad + 81\frac{1}{2}$ Addition Property of Equality

$168 = 6\ell$ Simplify.

$28 = \ell$ Division Property of Equality

The length is 28 feet.

Practice.. Write and solve an equation for each exercise. Check your solution.

PG.157

2. The Yearbook Club is going to an amusement park, and each of their 12 members will pay for admission and will also help pay for parking. The Robotics Club is going to a waterpark, and each of their 14 members will pay for admission and will also purchase a meal ticket. Admission to the amusement park is 1.5 times that of the waterpark's admission, as shown in the table. If the total cost is the same at both the amusement park and the waterpark, what is the admission per student to the waterpark?

Amusement Park	Waterpark
Admission: \$1.5x per student	Admission: \$$x$ per student
Parking: \$2 per student	Meal Ticket: \$10.50 per student

Write an equation.

Let x = the cost of admission to the waterpark.

The cost of the amusement park: $12(1.5x + 2)$

The cost of the waterpark: $14(x + 10.50)$

Because the costs are equal set the expressions equal to each other: $12(1.5x + 2) = 14(x + 10.5)$

Solve the equation $12(1.5x + 2) = 14(x + 10.5)$.

$12(1.5x + 2) = 14(x + 10.5)$	Write the equation.
$18x + 24 = 14x + 147$	Distributive Property
$-14x \quad -14x$	Subtraction Property of Equality
$4x + 24 = 147$	Simplify.
$-24 \quad -24$	Subtraction Property of Equality
$4x = 123$	Simplify.
$\frac{4x}{4} = \frac{123}{4}$	Division Property of Equality
$x = 30.75$	Simplify.

The cost of admission to the waterpark is \$30.75.

almanahj.com/ae

Determine the Number of Solutions

	No Solution	One Solution	Infinite Solution
Symbols	$a = b$	$x = a$	$a = a$
Examples	$3x + 4 = 3x$ $4 = 0$ Since $4 \neq 0$, there is no solution.	$2x = 20$ $x = 10$ Since $x = 10$, there is one solution.	$4x + 2 = 4x + 2$ $2 = 2$ Since $2 = 2$, all of the values of x are solutions.
Equation	$6x + 3 = 6x + 1$	$6x + 3 = 4x + 1$	$6x + 3 = 6x + 3$
Coefficients	the same	**different**	the same
Constants	**different**	different or the same	**the same**

almanahj.com/ae
2026 2025
موقع المناهج الإماراتية

Practice..

Solve each equation. Determine whether the equation has one solution, no solution, or infinitely many solutions. (Examples 1 and 2)

PG.167

1. $4(x - 8) + 12 = 2(2x - 9)$

$$4(x-8)+12=2(2x-9)$$
$$4x-32+12=4x-18$$
$$4x-20=4x-18$$
$$-4x \quad -4x$$
$$20=-18$$

no solution

2. $3(2k - 5) = 6(k - 4) + 9$

$$3(2k-5)=6(k-4)+9$$
$$6k-15=6k-24+9$$
$$6k-15=6k-15$$
$$-6k \quad -6k$$
$$-15=-15$$

infinitely many solutions

3. $-4y - 3 = \frac{1}{3}(12y - 9) - 8y$

$$-4y-3=\frac{1}{3}(12y-9)-8y$$
$$-4y-3=4y-3-8y$$
$$-4y-3=-4y-3$$
$$+4y \quad +4y$$
$$-3=-3$$

infinitely many solutions.

4. $6(3 - 5w) = 5(4 - 2w) - 20w$

$$6(3-5w)=5(4-2w)-20w$$
$$18-30w=20-10w-20w$$
$$18-30w=20-30w$$
$$+30w \quad +30w$$
$$18=20$$

no solution

almanahj.com/ae

Practice. Complete each equation so that it has infinitely many solutions. (Example 3) **PG.167**

5. $2x - 7(x + 10) = \square x - \square$

$2x - 7(x + 10) = ____ x - ____$

$2 \quad x - 7x - 70 = ____ x - ____$

$-5x - 70 = ____ x - ____$

$-5x - 70 = -5x - 70$

ANSWER:

$2x - 7(x + 10) = -5x - 70$

6. $12x - x + 8 + 3x = \square x + \square$

$12x - x + 8 + 3x = ____ x + ____$

$14x + 8 = ____ x + ____$

$14x + 8 = 14x + 8$

ANSWER:

$12x - x + 8 + 3x = 14x + 8$

almanahj.com/ae 2026 2025 موقع المناهج الإماراتية



Alshyiam School C2 & 3

Math Department

Unit 4

Done by:
Laila Alrashedi

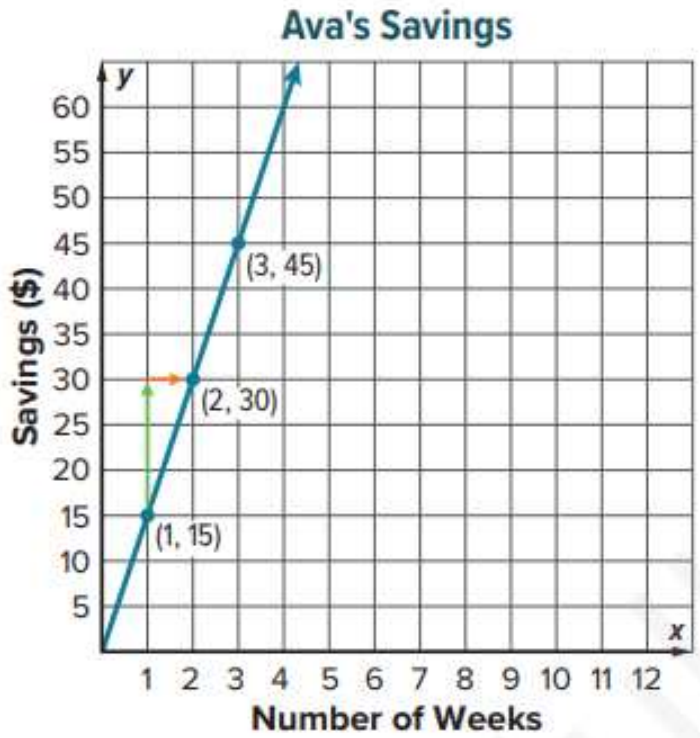
School Principal:
Noura AlGaithi

PG.177-180

Example 1 Proportional Relationships and Slope

The graph shows the amount of money Ava saved over several weeks.

Find and interpret the slope. Then find the unit rate and compare it to the slope.



Part A Find and interpret the slope.

To find the slope, find the constant rate of change. Choose any two points on the line, such as (1, 15) and (2, 30). Then find the rate of change between the points.

$$\frac{\text{change in savings}}{\text{change in weeks}} = \frac{\$(30 - 15)}{(2 - 1)\text{ weeks}}$$

$$= \frac{\$\ 15}{1\ \text{week}}$$

The constant rate of change is \$15 per week. So, the slope of the line is $\frac{15}{1}$ or 15. This means that Ava saved \$15 every week.

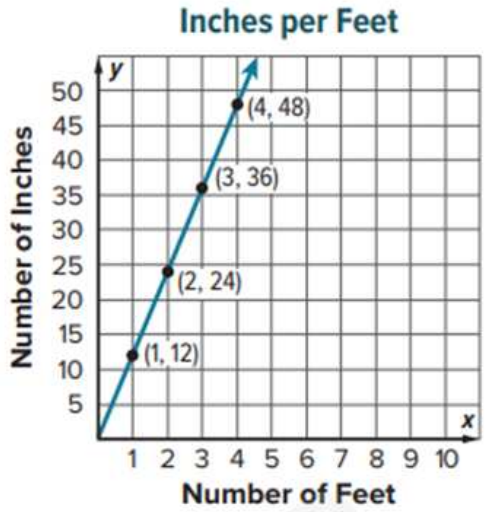
Part B Find the unit rate and compare it to the slope.

Ava saved \$ 15 every week. So, the unit rate is \$15 per week, which is also the slope of the line.

PG.177-180

Check

The graph shows the relationship between feet and inches.



Part A

Which of the following is the correct interpretation of the slope?

- (A) The slope of the line is $\frac{12}{1}$. This means that there are 12 inches in 1 foot.
- ◯ The slope of the line is $\frac{1}{12}$. This means that there are 12 inches in 1 foot.
- ◯ The slope of the line is $\frac{24}{1}$. This means that there are 24 inches in 1 foot.
- ◯ The slope of the line is $\frac{36}{2}$. This means that there are 36 inches in 2 feet.

Part B

Find the unit rate and compare it to the slope.

The unit rate is 12 inches per foot, which is also the slope of the line.

PG.177-180

Example 2 Graph Proportional Relationships

The distance y in miles that a certain cyclist can ride and the time x in hours are in a proportional relationship. This can be represented by the equation $y = 12x$.

Graph the equation. Then find and interpret the slope.

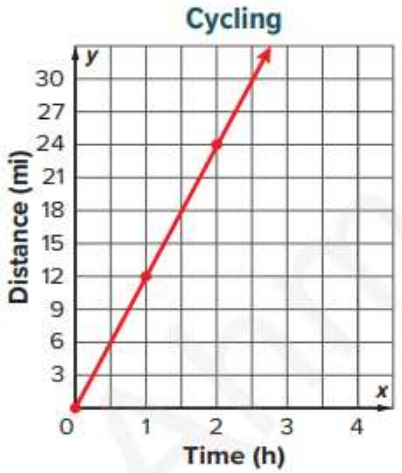
Part A Graph the equation.

Step 1 Make a table of values to find the distance for 0, 1, and 2 hours.

Hours, x	$y = 12x$	Miles, y
0	$y = 12(0)$	0
1	$y = 12(1)$	12
2	$y = 12(2)$	24

Step 2 Graph the ordered pairs.

Graph the ordered pairs (0, 0), (1, 12), and (2, 24) from the table. Then draw a line through the points.



Part B Find and interpret the slope.

In the equation of a proportional linear relationship $y = mx$, m represents the unit rate or slope. The equation $y = 12x$ represents the distance y in miles that the cyclist can ride in x hours.

So, the slope of the line is $\frac{12}{1}$ or 12. This means that the cyclist can ride 12 miles per hour.

Practice..

PG.189

1. The graph shows the amount of book sales over several days. Find and interpret the slope. Then find the unit rate and compare it to the slope. (Example 1)



$$\frac{\text{change in sales}}{\text{change in days}} = \frac{\$(2{,}000 - 1{,}000)}{(6-3)\ \text{days}} = \frac{\$1{,}000}{3\ \text{days}} \approx \frac{\$1{,}000}{1\ \text{day}}$$ or about \$333.33 per day

2. The cost y of renting a snowmobile for x hours is a proportional relationship. This can be represented by the equation $y = 33.75x$. Graph the equation. Then find and interpret the slope. (Example 2)

Slope = 33.75

unite rate = $\frac{y}{x} = \frac{33.75}{1}$



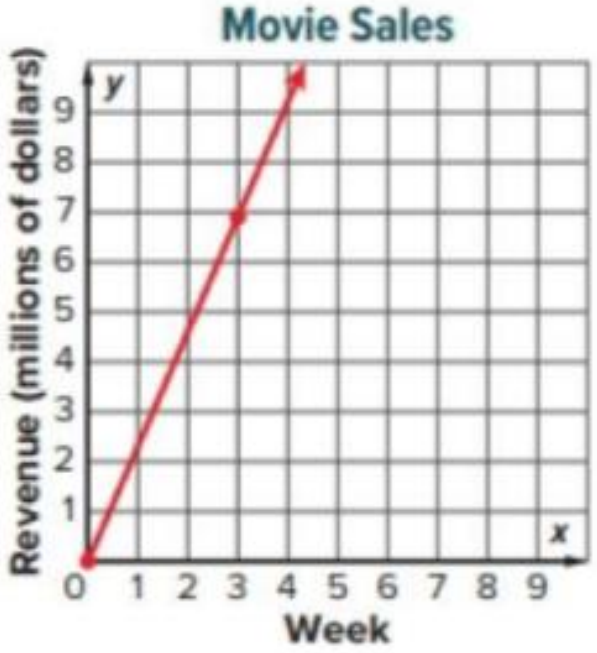
Hours, x	$y = 33.75x$	Cost ($)
0	$y = 33.75(0)$	0
4	$y = 33.75(4)$	135
8	$y = 33.75(8)$	270

The slope of the line is $\frac{33.75}{1}$ or 33.75.

This means that it costs \$33.75 per hour to rent the snowmobile.

PG.189

3. By the end of its fourth week, a movie had grossed \$9.2 million. Assume the revenue y in millions of dollars is proportional to the week x. Graph this relationship on the coordinate plane. Then find and interpret the slope. (Example 3)



Graph the relationship. Find the unit rate.

\$9.2 million in 4 weeks $= \frac{9.2 \text{ million}}{4 \text{ weeks}}$ Write the rate as a fraction.

$= \frac{2.3 \text{ million}}{1 \text{ week}}$ Simplify.

The unit rate is 2.3 million per week.

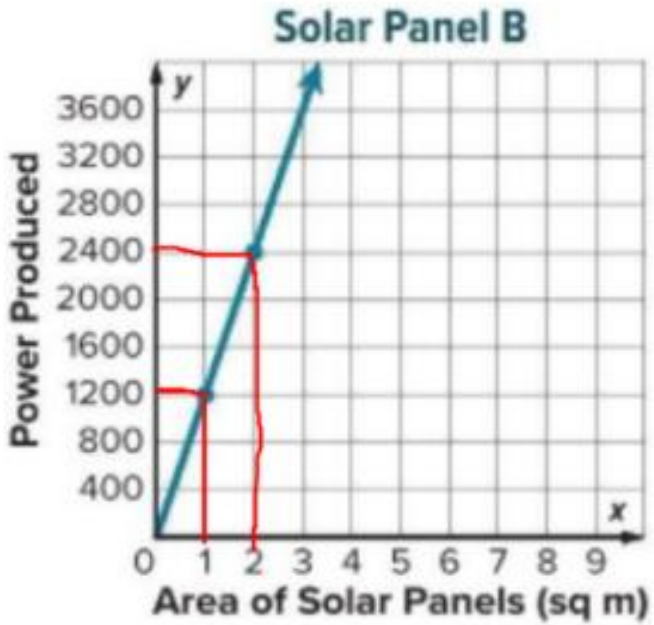
Make a table of values to find the revenue for 0 and 3 weeks.

Weeks, x	Revenue (in millions of dollars)
0	0
3	6.9

The slope of the line is $\frac{2.3}{1}$ or 2.3. This means that the movie grossed \$2.3 million each week

PG.189

4. The amount of power y solar panel A can produce with an area of x square meters can be represented by the equation $y = 1{,}020x$. The amount of power a solar panel B can produce is shown on the graph. Which solar panel can produce more power? Explain. (Example 4)



Find the slope or unit rate for solar panel A from the equation.

$y = 1{,}020x$ $\quad$ $y = mx$, m = slope or unit rate

$m = 1{,}020$ $\quad$ The coefficient of x.

The unit rate for solar panel A is 1,020 power produced per square meters.

Find the constant rate of change for solar panel B from the graph.

Choose any two points on the line, such as (1, 1,200) and (2, 2,400).

$$\frac{(2{,}400 - 1{,}200)}{(2 - 1)}$$ Find the rate of change between the points.

$$= \frac{1{,}200}{1}$$ Simplify.

The unit rate for solar panel B is 1,200 power produced per square meters.

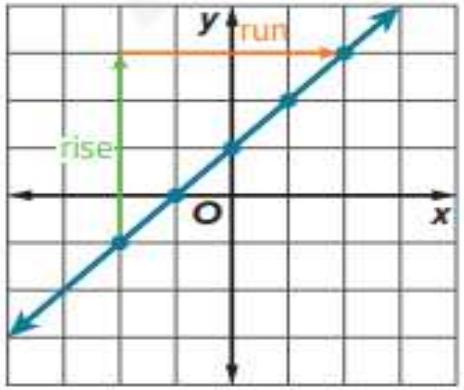
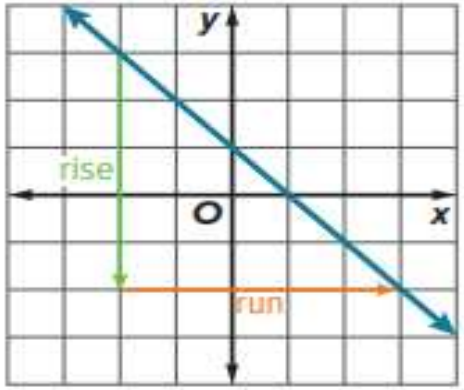
Because $1{,}200 > 1{,}020$, panel B produces more power.

Learn Slope of a Line

The term slope is used to describe the steepness of a line. Slope is the rate of change between any two points on a line. The vertical change (change in *y*-value) is called the **rise** while the horizontal change (change in *x*-value) is called the **run**. So, slope is the ratio of the rise to the run. In linear relationships, the slope is always constant.

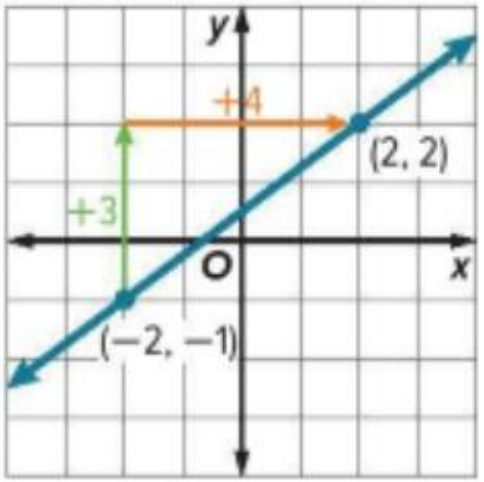
$$\text{slope} = \frac{\text{rise} \leftarrow \text{vertical change between any two points}}{\text{run} \leftarrow \text{horizontal change between the same two points}}$$

Slope can be positive or negative. The slope of a line that points upward from, from left to right, is positive, and the slope of a line that points downward, from left to right, is negative.

Positive Slope	Negative Slope
	

Learn Find Slope from a Graph

The slope of a line can be found from a graph by finding the ratio of the rise to the run between any two points on the line.



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{3}{4}$$

← vertical change between (−2, −1) and (2, 2)

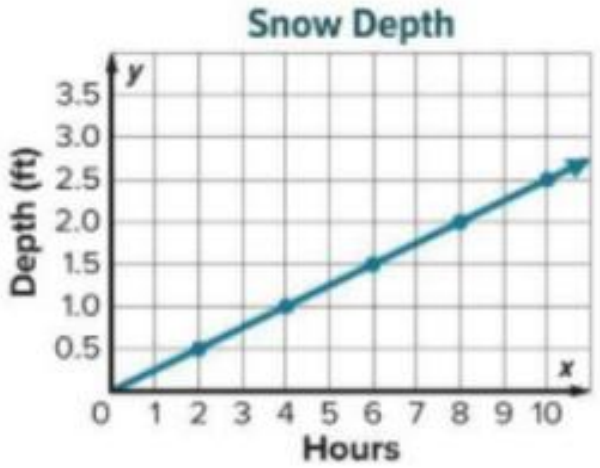
← horizontal change between (−2, −1) and (2, 2)

When reading the rise and run from a graph, a rise up is positive, a rise down is negative, a run to the right is positive, and a run to the left is negative.

Practice..

PG. 203

1. The graph shows the depth in feet of snow after each two-hour period during a snowstorm. Find the slope of the line. (Example 1)



Select two points from the graph. Sample points (4, 1) and (8, 2).

$\text{slope} = \frac{\text{rise}}{\text{run}}$ Definition of slope

$= \frac{1}{4}$ or 0.25 rise = 1, run = 4

ANSWER:

$\frac{1}{4}$ or 0.25

2. The graph shows the amount of money left after buying video games. Find the slope of the line. (Example 2)



Select two points from the graph. Sample points (2, 80) and (4, 40).

$\text{slope} = \frac{\text{rise}}{\text{run}}$ Definition of slope

$= \frac{-40}{2}$ rise = −40, run = 2

$= \frac{-20}{1}$ Simplify the ratio.

ANSWER:

−20

almanahj.com/ae

PG. 203

3. The points given in the table lie on a line. Find the slope of the line. (Example 3)

x	−1	2	5	8
y	3	−1	−5	−9

$$\text{slope} = \frac{\text{change in } y}{\text{change in } x} \qquad \text{Definition of slope}$$

$$= \frac{(-1-3)}{(2-(-1)} \qquad \text{Use the points } (-1, 3) \text{ and } (2, -1).$$

$$= -\frac{4}{3} \text{ or } -1\frac{1}{3} \text{ or } -1.\bar{3} \qquad \text{Simplify.}$$

Find the slope of the line that passes through each pair of points. (Examples 4–6)

4. $M(3, 5)$, $N(2, 6)$

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

$$= \frac{6-5}{2-3}$$

$$= \frac{1}{-1} \text{ or } -1$$

5. $G(-3, 2)$, $H(7, 2)$

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

$$= \frac{2-2}{7-(-3)}$$

$$= \frac{0}{-10} \text{ or } 0$$

ANSWER:

0

6. $E(6, 8)$, $F(6, -2)$

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

$$= \frac{-2-8}{6-6}$$

$$= \frac{-10}{0}$$

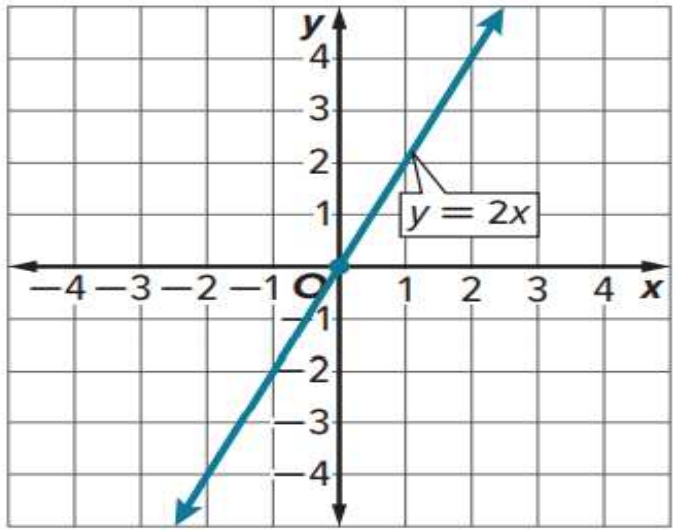
ANSWER:

undefined

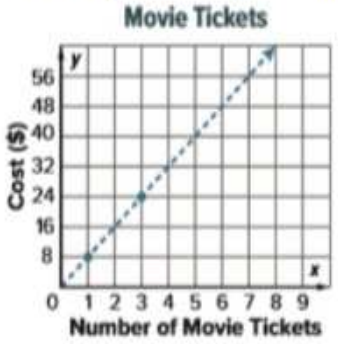
almanahj.com/ae

Learn Direct Variation

When the ratio of two variable quantities is constant, a proportional linear relationship exists. This proportional linear relationship is called a **direct variation**. The constant ratio is also called the **constant of variation** or the **constant of proportionality**. In the direct variation equation, $y = mx$, m represents the constant of variation, the constant of proportionality, the slope, and the unit rate.

Words	Example
A direct variation is a linear relationship in which the ratio of y to x is a constant, m. We say y varies directly with x.	$y = 2x$
Symbols	**Graph**
$m = \frac{y}{x}$ or $y = mx$, where m is the constant of variation and $m \neq 0$.	

1. The cost y of movie tickets varies directly with the number of tickets x as shown in the graph. Write a direct variation equation to represent this relationship. Then identify the constant of variation and interpret its meaning.



SOLUTION:

Write a direct variation equation.

Find the slope m using the graph.

$\text{slope} = \frac{\text{rise}}{\text{run}}$ Definition of slope

$\text{slope} = \frac{24-8}{3-1}$ Use the points (1, 8) and (3, 24) from the line.

$\text{slope} = \frac{16}{2}$ Simplify.

$\text{Slope} = \frac{8}{1}$ or 8 Simplify.

Use the value of m to write the equation.

$y = mx$ Direct variation equation

$y = 8x$ Replace m with 8.

The constant of variation is equal to the slope of the graph. So, the constant of variation is 8. This means that the cost per ticket is $8.

ANSWER:

$y = 8x$; The constant of variation is 8. This means that the cost per ticket is $8.

2. The number of miles y varies directly with the number of hours x as shown in the graph. Write a direct variation equation to represent this relationship. Then identify the constant of variation and interpret its meaning.



PG. 223

SOLUTION:

Write a direct variation equation.

Find the slope m using the graph.

$\text{slope} = \frac{\text{rise}}{\text{run}}$ Definition of slope

$\text{slope} = \frac{390-195}{6-3}$ Use the points (3, 195) and (6, 390) from the line.

$\text{slope} = \frac{195}{3}$ Simplify.

$\text{Slope} = \frac{65}{1}$ or 65 Simplify.

Use the value of m to write the equation.

$y = mx$ Direct variation equation

$y = 65x$ Replace m with 65.

The constant of variation is equal to the slope of the graph. So, the constant of variation is 65. This means that the number of miles per hour is 65.

ANSWER:

$y = 65x$; The constant of variation is 65. This means that the number of miles per hour is 65.

almanahj.com/ae

PG. 223

3. The cost of paper varies directly with the number of reams bought. Suppose two reams cost $5.10. Write a direct variation equation to represent this relationship. Then identify the constant of variation and interpret its meaning. (Example 2)

SOLUTION:

Write a direct variation equation.

Find the unit rate m.

$$\$5.10 \text{ for } 2 \text{ reams} = \frac{\$5.10}{2 \text{ reams}}$$ Write the rate as a fraction.

$$= \frac{\$2.55}{1 \text{ ream}}$$ Simplify.

The unit rate is $2.55 per ream.

Use the value of m to write the equation.

$y = mx$ Direct variation equation

$y = 2.55x$ Replace m with 2.55.

The constant of variation is equal to the slope of the graph. So, the constant of variation is 2.55. This means that the cost per ream is $2.55.

ANSWER:

$y = 2.55x$; The constant of variation is 2.55. This means that the cost per ream is $2.55.

4. The amount of flour needed for a recipe varies directly with the number of servings planned. Three servings require $4\frac{1}{2}$ cups of flour. Write a direct variation equation to represent this relationship. Then identify the constant of variation and interpret its meaning. (Example 2)

SOLUTION:

Write a direct variation equation.

Find the unit rate m.

$$\text{cups for 3 servings} = \frac{4\frac{1}{2} \text{ cups}}{3 \text{ servings}}$$ Write the rate as a fraction.

$$= \frac{1\frac{1}{2} \text{ cups}}{1 \text{ serving}}$$ Simplify.

The unit rate is 1.5 or $1\frac{1}{2}$ cups per serving.

Use the value of m to write the equation.

$y = mx$ Direct variation equation

$y = 1.5x$ Replace m with 1.5.

The constant of variation is equal to the slope of the graph. So, the constant of variation is 1.5. This means that each serving requires $1\frac{1}{2}$ cups of flour.

ANSWER:

$y = 1.5x$; The constant of variation is 1.5. This means that each serving requires $1\frac{1}{2}$ cups of flour.

almanahj.com

PG. 235

PG. 235

Identify the slope and *y*-intercept of the graph of each equation. (Example 1)

1. $y = \frac{1}{2}x - 5$

slope: $\frac{1}{2}$

y-intercept: -5

2. $y = 3x - 1$

slope: 3

y-intercept: -1

Write the equation of a line in slope-intercept form with each slope and *y*-intercept. (Example 2)

3. slope $= -\frac{1}{3}$, *y*-intercept $= 4$

$$y = mx + b$$
$$y = -\frac{1}{3}x + 4$$

4. slope $= \frac{3}{2}$, *y*-intercept $= -3$

$$y = mx + b$$
$$y = \frac{3}{2}x + (-3)$$
$$y = \frac{3}{2}x - 3$$

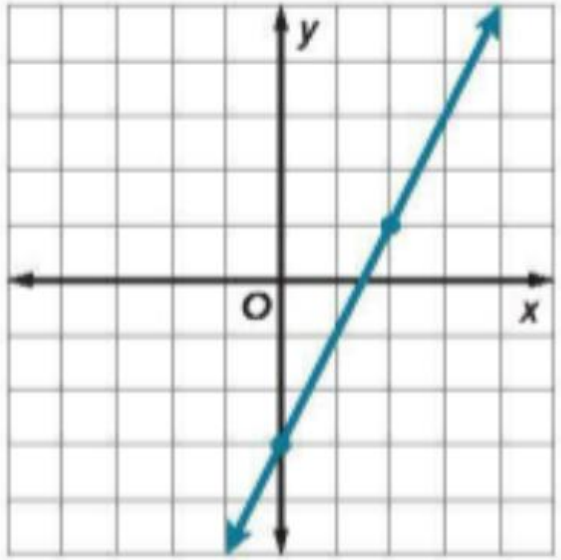
5. slope $= 4$, *y*-intercept $= -2$

$$y = mx + b$$
$$y = 4x + (-2)$$
$$y = 4x - 2$$

6. slope $= -1$, *y*-intercept $= 6$

$$y = mx + b$$
$$y = -1x + 6$$
$$y = -x + 6$$

7. Write an equation in slope-intercept form for the graph shown. (Example 3)



SOLUTION:

Find the y-intercept.

The line crosses the y-axis at $(0, -3)$.

Find the slope.

From $(0, -3)$ move up 4 units and right 2 units to another point on the line.

$\text{slope} = \frac{4}{2}$ slope = rise over run

$= \frac{2}{1}$ or 2 Simplify.

Write the equation.

$y = mx + b$ Slope-intercept form

$y = 2x + (-3)$ Replace m with 2 and b with -3.

$y = 2x - 3$ Simplify.

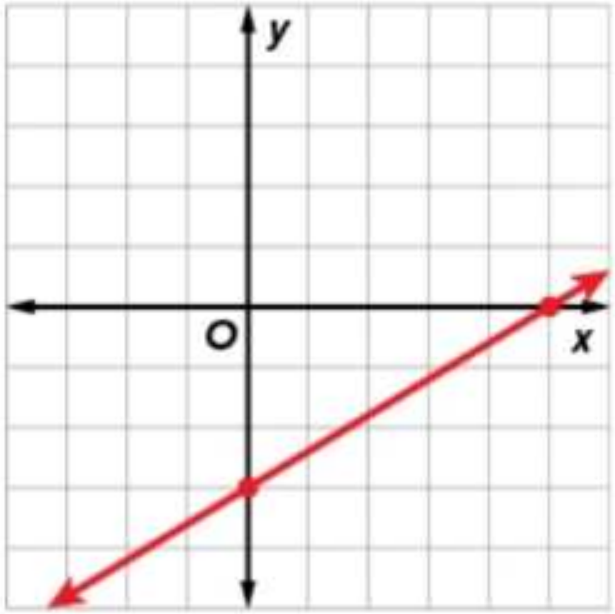
ANSWER:

$y = 2x - 3$

Graph each equation using the slope and y-intercept. (Example 1)

PG. 245

1. $y = \frac{3}{5}x - 3$



SOLUTION:

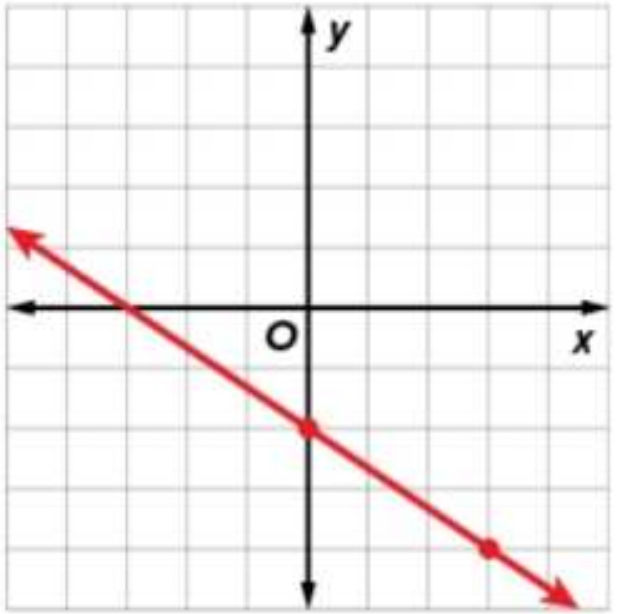
Identify the slope and y-intercept.

$y = \frac{3}{5}x - 3$ Write the equation in the form $y = mx + b$.

$y = mx + b$ $m = \frac{3}{5}, b = -3$

slope: $\frac{3}{5}$; y-intercept: -3

2. $y = -\frac{2}{3}x - 2$



SOLUTION:

Identify the slope and y-intercept.

$y = -\frac{2}{3}x - 2$ Write the equation in the form $y = mx + b$.

$y = mx + b$ $m = -\frac{2}{3}, b = -2$

slope: $-\frac{2}{3}$; y-intercept: -2

PG. 245

3. The equation $y = \frac{1}{5}x + 3.5$ can be used to find the amount of accumulated snow y in inches x hours after 5 P.M. on a certain day. Graph this equation. (Example 2)



SOLUTION:

Identify the slope and y-intercept.

$y = \frac{1}{5}x + 3.5$ Write the equation in the form $y = mx + b$.

$y = mx + b$ $m = \frac{1}{5}, b = 3.5$

slope: $\frac{1}{5}$; y-intercept: 3.5

4. Alliyah's gift card balance can be represented by the equation $y = -5x + 50$, where y represents the gift card balance after x number of days. Graph this equation. (Example 2)



SOLUTION:

Identify the slope and y-intercept.

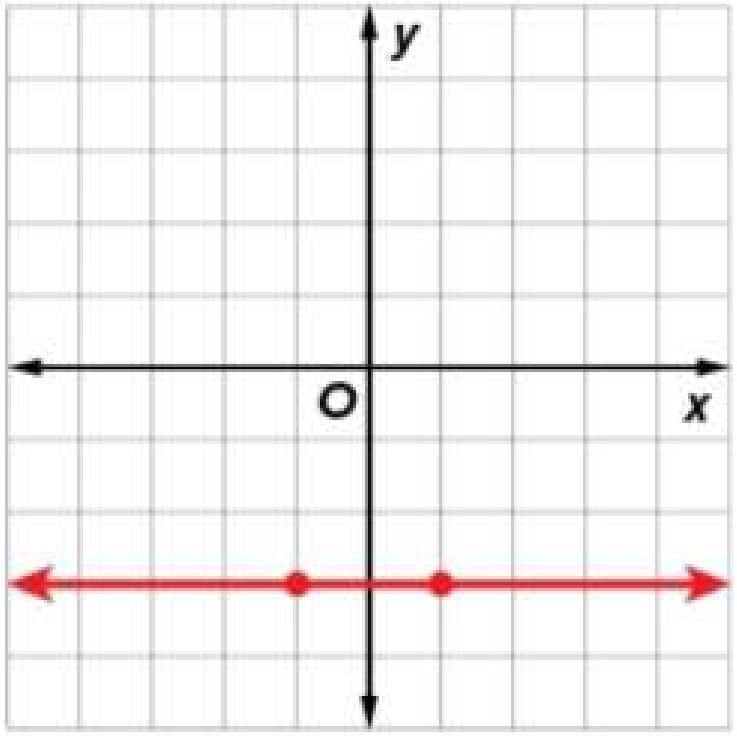
$y = -5x + 50$ Write the equation in the form $y = mx + b$.

$y = mx + b$ $m = -5, b = 50$

slope: -5; y-intercept: 50

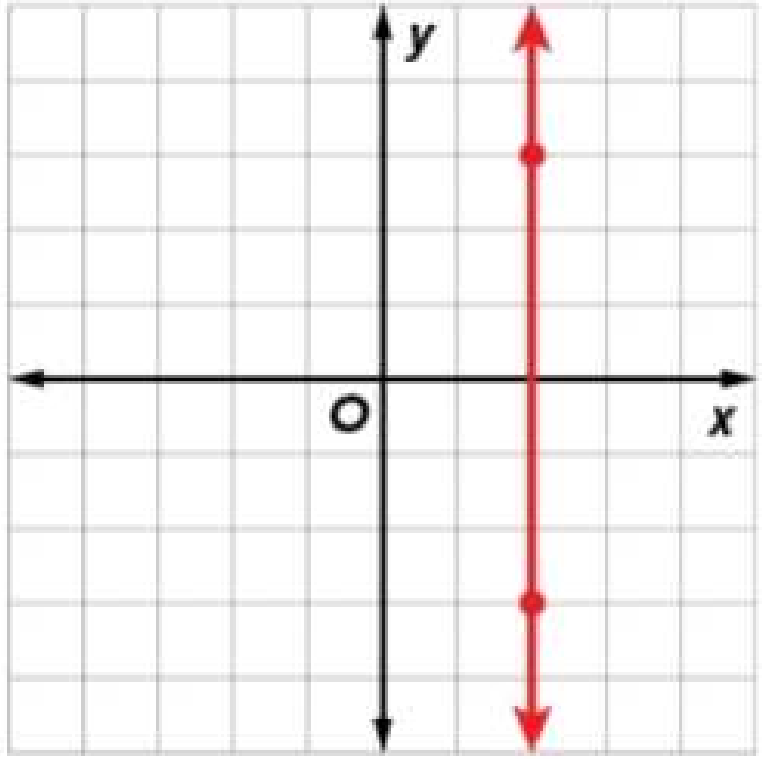
Graph each equation. (Examples 3 and 4)

5. $y = -3$



Graph each equation. (Examples 3 and 4)

6. $x = 2$



PG. 245

Good Luck

Done by:
Meera Alhassani

School Principle:
Afra Alshamesi