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Author
 Melissa Carmelo Morales
 Rania Yasin Mohammed
 Heba Alaa Aldeen Omar

Art Director - Illustration
 Naseem M Imtair

• Contribute in designing Mahmoud Abu Fares

• Editor Noor Fathi Saber Tassneem Al Khateeb

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Tel. + 962 6 515 7 555 Fax. + 962 6 515 7 550 Mob. + 962 7 77 08 00 09 info@ajyall.com

> f D Y 0 S www.ajyall.com

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## Multiplication and Division of Whole Numbers

![](_page_3_Picture_2.jpeg)

## Vocabulary

- Prime number
- Composite number
- Factor
- Multiple
- Factorization
- Prime factorization
- Greatest Common Factor (GCF)
- Least Common Multiple (LCM)

## Objectives

![](_page_4_Picture_10.jpeg)

- Multiply a whole number by 3-digit number.
- Divide a whole number by 2-digit number.
- Solve multi-digit multiplication and division problems using standard algorithms.
- Define prime and composite numbers.
- Recognize that number one is neither prime nor composite.
- Identify all factors of a given number.
- Identify a set of multiples of a given number.
- Determine the Greatest Common Factor of two or more numbers.
- Determine the Least Common Multiple of two or more numbers.

## (1-1) Multiplication of a Whole Number by 3-Digits

![](_page_5_Figure_1.jpeg)

• Find the product. Check your answer using a calculator.

![](_page_5_Figure_3.jpeg)

a) Taghreed makes and sells traditional bead bracelets. Each bracelet is made of 125 beads. Last year she sold 2,128 bracelets. How many beads did she use?
 125 × 2,128 = 266,000 beads

**b)** Write a problem of your own, about the multiplication of two numbers, then solve it.

## • (1-2) Division of a Whole Number by 2-Digits

![](_page_6_Figure_1.jpeg)

#### • Find the quotient. Check your answer.

0032 72 2315 <u>216</u> 155 144 011	check the answer $32 \times 72 + 11 =$ 2,304 + 11 = = 2,315	0185 499083 44 418 392 263 245 18	check the answer 185×49+18= 9,065 + 18 = 9,083
00618 54 33372 <u>324</u> 97 54 432 432 000	618 × 45 = 33,372	$ \begin{array}{r} 0 & 0 & 0 & 6 & 9 \\ 1 & 8 & 0 & 1 & 2 & 4 & 2 & 0 \\  & 1 & 0 & 8 & 0 \\ 1 & 6 & 2 & 0 \\ 1 & 6 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{array} $	180 × 69 = 12,420

O Choose (Yes) or (No) to indicate whether the answer is correct.

![](_page_7_Figure_1.jpeg)

![](_page_7_Picture_2.jpeg)

Fill the blank to make the sentence true. Then discuss with your classmate.

![](_page_7_Figure_4.jpeg)

## • (1-3) Prime and Composite Numbers

When dividing numbers to find their factors you will come across two types of numbers:

Prime number—has only two factors, 1 and itself.

Example:
5 is a prime number
because the only factors are <b>1</b> and 5.
Composite number—has more than two factors.
Example:
15 is a composite number, because there are more than two
factors.

15, 5, 3,1

### • Circle all the prime numbers.

![](_page_8_Figure_6.jpeg)

![](_page_9_Figure_0.jpeg)

## O ── (1-4) Factorization

• A multiple is a number that is the product of two numbers.

 $5 \times 8 = 40$ 

- How to find the multiples of a given number:
- The multiples of 5 are

5, 10, 15, 20 ...

- Since:
- $5 \times 1 = 5$  $5 \times 2 = 10$
- $5 \times 3 = 15$
- 5×4= 20

The multiples of a number can go on infinitely.

• A factor is multiplied by another number to get a product.

**5**×**8**= 40

- How to find the factors of a given number:
- <u>Find the factors of 40:</u> Think which two numbers can be multiplied to get a product of 40?

 $40 \times 1 = 40$   $20 \times 2 = 40$   $10 \times 4 = 40$   $8 \times 5 = 40$ So the factors are: 1, 2, 4, 5, 8, 10, 20, 40

Every number can be written as a product of prime numbers.

This product is called prime factorization. You can use a diagram called a factor tree to find the prime factorization.

Examples:	Method 1		Me	thod 2	
	Factor tree		Repeat	ed Divis	ion
00=2~2~3~5	60		2	60	60÷2= 30
	30	~ ~	2	30	30÷2= 15
	2 30	OR	3	15	15÷3= 5
	2 15		5	5	5÷5= 1
	35			1	Q
					Meth CIT ?

## O Complete the factor trees.

![](_page_11_Figure_1.jpeg)

### • Find the prime factorization using the repeated division method.

2	80	$(80 \div 2 = 40)$
2	40	$(40 \div 2 = 20)$
2	20	$(20 \div 2 = 10)$
2	10	(10 ÷ 2 = 5)
5	5	(5 ÷ 5 = 1)
	1	

2	64	<b>(</b> 64 ÷ 2 = 32 <b>)</b>	
2	32	(32 ÷ 2 = 16)	
2	16	<b>(</b> 16 ÷ 2 = 8 <b>)</b>	
2	8	$(8 \div 2 = 4)$	
2	4	$(4 \div 2 = 2)$	
2	2	$(2 \div 2 = 1)$	
	1		

![](_page_12_Picture_0.jpeg)

### • Are multiples of 3 always odd? Explain.

No, they are not. When 3 is multiplied by on even number, the product will be an even number and when 3 is multiplied by an odd number, the product will be an odd number.

Your Work

a)	Find the prime factorization of 450.	5	450
		5	90
	450 5×5×2×3×3	2	18
	450= 000020000	3	9
		3	3
b) Writ	ite numbers that have the numbers (5, 2, 7)		1
	35,70,140		

## (1-5) The Greatest Common Factor (GCF)

The Greatest Common Factor (GCF), also called Greatest Common Divisor (GCD) is the greatest factor shared between two or more numbers.

![](_page_13_Figure_2.jpeg)

O Determine the Greatest Common Factor of each set of numbers.

6, 24	30, 20	
6= 2 x 3	30=	5 x 2 x 3
24= 2 x 2 x 3 x 2	20=	2 x 2 x 5
$GCF=2\times3=6$	GCF=	2 x 5 = 10
<ul> <li>30, 18</li> </ul>	• 6, 22	
30= 5 x 2 x 3	6=	2 x 3
18= <mark>2 x 3 x 3</mark>	22=	2 x 11
$GCF = 2 \times 3 = 6$	GCF=	2
• 42. 58	• 63.36	
$42 = 2 \times 3 \times 7$	63=	3 x 7 x 3
$58 = 2 \times 29$	36=	2 x 2 x 3 x 3
GCF= 2	GCF=	3 x 3 = 9
Your Work		
Find the GCF of 48, 50, 75.		
48 = 2 x 2 x 3 x 2 x 2		
50 = 2 x 5 x 5		
$75 = 3 \times 5 \times 5$	GCF = 1	

## (1-6) The Least Common Multiple (LCM)

The Least Common Multiple (LCM) of a group of numbers is the lowest number that can be divided by each number in the group, without leaving a remainder.

#### Example:

To find the LCM of the numbers 3, 6 and 8 list the multiples of each number, and select the smallest number common to each.

- Step 1: Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30,...
- Step 2: Multiples of 6 are 6, 12, 18, 24, 30, 36...
- Step 3: Multiples of 8 are **8**, **16**, **24**, **32**... LCM= 24

Describe how to find the multiples for each number.

### • Find the Least Common Multiple of the numbers below. Follow the directions.

- Multiples of 9 are 9 18 27 36 45 54 ...
- Multiples of 15 are 15 30 45 60 75 90 ...

The common multiples are .....45.....

The LCM is ....45

Multiples of 10 are 10 20 30 40 50 60 70 80 90 100

Multiples of 20 are 40 60 80 100 120 140

Multiples of 50 are (50) 100 (150) 200 (250) 300

Your Work

Find the LCM of 48, 12.

48

Write two numbers that the least Common multiple of them is 30.

15, 10

Discuss your answer.

15,30 / 10,20,30

## • (1-7) Problem Solving

![](_page_16_Picture_1.jpeg)

A hall has two towers with rotating floodlights. Floodlight A takes 30 seconds to complete a revolution while Floodlight B takes 25 seconds. At a certain instance, both floodlights shine at point C. When will both floodlights shine again? simultaneously on point C?

30, 60, 90, 120, 150 25, 50, 75, 100, 125, 150 150 seconds

Sara has 3 types of ribbon of lengths 84cm, 140cm and 308cm. She wishes to cut the ribbons into pieces of the same length for making butterfly knots.

a) What is the greatest possible length that she can cut for each piece, if no ribbon is to be left unused?
 GCE = 7

b) How many pieces of butterfly knots of equal lengths will she get?

12 + 20 + 44 = 76

## - Show Your Turn -

## O Circle.

### 1 A factor is:

- a. A number multiplied by another number to find a product.
- b. The product of a given whole number and another whole number.
- c. The greatest factor that two or more numbers have in common.

### 2 A multiple is:

- a. A number multiplied by another number to find a product.
- b. The product of a given whole number and another whole number.
- c. The greatest factor that two or more numbers have in common.

3 The factors of 12 are:	4 The GCF of 27 and 30 is:
a. 1, 2, 3, 6, 12	a. 1
b. 1, 2, 3, 6, 12	b. 3
c. 1, 2, 3, 4, 6, 12	c. 9

5 The GCF of 12 and 18 is:	6 The LCM of 3 and 5 is:
a. 3	a. 45
b. 6	b. 30
c. 9	c. 15

### • Find the answer, then check.

6,480 863 × 256  $\times$  538 38880 6904 25890 324000 431500 1296000 464,294 1,658.880 464294 ÷ 538 = 863  $1658880 \div 256 = 648$ 

![](_page_18_Figure_2.jpeg)

![](_page_19_Picture_0.jpeg)

## Fractions and Decimals

![](_page_19_Picture_2.jpeg)

## • Vocabulary

- Fraction
   Reciprocal
- Numerator Decimal
- Denominator
   Convert
- Mixed number
- Improper fraction
- Simplest form

![](_page_20_Picture_7.jpeg)

## Objectives

- Multiply fractions and mixed numbers.
- Divide fractions and mixed numbers.
- Find the reciprocal of a fraction.
- Convert fractions and mixed numbers to decimals and vice versa.
- Add and subtract decimals.
- Solve problems about fractions and decimals.

## (2-1) Multiply Fractions

To multiply fractions, multiply the numerators and then the denominators. Notice that the denominators do not have to be the same.

$$\frac{3}{4} \times \frac{1}{2} = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}$$

Note that:

There are 3 parts of 4 colored blue, and 1 part of 2 colored yellow.

So there are 3 parts of 8 colored twice (colored green).

To multiply mixed numbers both factors must be in the form of fractions.

![](_page_21_Picture_7.jpeg)

![](_page_21_Figure_8.jpeg)

$\rightarrow \frac{1}{2} \leftarrow$	

• Find, then write in the simplest form.

 $\frac{1}{6} \times \frac{3}{4} = \frac{3}{24} = \frac{1}{8}$   $\frac{1}{10} \times \frac{7}{12} = \frac{56}{120}$   $\frac{1}{5} \times \frac{25}{9} = \frac{25}{45} = \frac{5}{9}$   $\frac{5}{4} \times 4\frac{1}{3} = \frac{4}{5} \times \frac{13}{3} = \frac{65}{12} = 5\frac{5}{12}$ 

## Choose (Yes) or (No) to indicate whether the answer is correct. Discuss.

a) 
$$\frac{3}{4} \times 4 \frac{1}{5} = \frac{3}{5}$$
 No b)  $\frac{\frac{12}{5}}{5} \times \frac{3}{8_4} = \frac{1 \times 3}{5 \times 4} = \frac{3}{20}$   
Your Work  
Find  $1 \frac{3}{4} \times \frac{2}{3}$  using models.

## (2-2) Divide Fractions

Find  $3 \div \frac{1}{2}$  using models.

Step 1: draw 3 shapes.

![](_page_22_Picture_3.jpeg)

Step 2: divide each shape for 2 parts.

![](_page_22_Figure_5.jpeg)

Note that there are 6 parts.

and 
$$3 \times \frac{2}{1} = 6$$

Remember that division is the inverse operation of multiplication. Therefore, dividing by a fraction can be done by multiplying by its reciprocal.
 The reciprocal of a fraction is just the fraction turned upside down, so that the numerator and denominator have switched places.

![](_page_22_Figure_9.jpeg)

• Let's look at some reciprocals:

The reciprocal of  $\frac{7}{5}$  is  $\longrightarrow \frac{5}{7}$ The reciprocal of  $\frac{1}{2}$  is  $\longrightarrow \frac{2}{1}$ , or 2 The reciprocal of  $3\frac{1}{5} = \frac{16}{5} \longrightarrow \frac{5}{16}$ 

• Find the reciprocal.

a) 
$$\frac{3}{8}$$
 b)  $\frac{7}{4}$  c) 9

### • Find, then write in the simplest form.

a 
$$\frac{1}{2} \div \frac{2}{3} = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$$
  
b  $\frac{4}{9} \div \frac{1}{2} = \frac{4}{9} \times \frac{2}{1} = \frac{8}{9}$   
c  $\frac{5}{8} \div 1\frac{1}{4} = \frac{1}{2} \div \frac{5}{4} = \frac{5}{8} \times \frac{4}{5} = \frac{20}{40} = \frac{1}{2}$   
d  $\frac{6}{8} \div 2 = \frac{6}{8} \div \frac{1}{2} = \frac{6}{16} = \frac{3}{8}$   
Vour Work  
Use model to show that  $\frac{1}{2} \div 6 = \frac{1}{12}$   
 $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$ 

## • (2-3) Fractions and Decimals

### Converting fractions and mixed numbers to decimals.

$$\frac{7}{10} = 0.7$$
  $\frac{15}{100} = 0.15$   $3\frac{6}{10} = 3.6$   $\frac{54}{1000} = 0.054$ 

To convert a fraction to a decimal, divide the NUMERATOR by the DENOMINATOR until you get a decimal that terminates or repeats. If it repeats, place a bar over the number that repeats.

![](_page_24_Figure_4.jpeg)

Convert to decimals.

![](_page_24_Figure_6.jpeg)

O Convert to decimals using two different ways.

a) 
$$\frac{3}{5}$$
 b)  $\frac{1}{4}$  c)  $\frac{11}{2}$  d)  $\frac{13}{20}$ 

### Changing decimals to fractions or mixed numbers.

![](_page_25_Picture_1.jpeg)

Write the decimals in the numerator of the fraction without the decimal point.

2 Identify the place value of the last digit in the decimal. This is the denominator of the fraction.

![](_page_25_Figure_4.jpeg)

3 Simplify 
$$\frac{625 \div 5}{1000 \div 5} = \frac{125 \div 5}{200 \div 5} = \frac{25 \div 5}{40 \div 5} = \frac{5}{8}$$

$$2.36= 2 \frac{36 \div 4}{100 \div 4} = 2 \frac{9}{25}$$

### O Convert these decimals to fractions or mixed numbers.

![](_page_25_Figure_8.jpeg)

## • (2-4) Adding and Subtracting Decimals

### To add or subtract decimal numbers.

- Align numbers vertically by place value carefully lining up the decimal points.
- Put zeros in the empty digits.
- Add the numbers starting from the right.
- Drag the decimal point straight down.

Example:				
14- Note that:	-3.87+4.762=	→ 14.000 3.870 + 4.762 22.632	(14= 14.0= 14.000	))
+	5.6 3.72	5.6 + <u>3.72</u> 9.32	8.73 - <u>2.52</u> 6.21	
Find	+	5.60 <u>3.72</u> 9.32		
THIG.				
a) 4 +	2.84+17.5 02.84	b) -	29.3-4.781 29.100	
-	17.50		4.781	
	20.34		24.018 Spark	
			Ince	27

![](_page_27_Figure_0.jpeg)

![](_page_27_Figure_1.jpeg)

• Choose (Yes) or (No) to indicate if the addition is correct. Discuss and correct the false.

![](_page_27_Figure_3.jpeg)

- a) Use models to find the answer of (3.5+1.16)
- b) Find (0.75 0.04) using fractions, and write the outcome in the simplest form.

$$\frac{75}{100} - \frac{4}{100} = \frac{71}{100} = 0.71$$

## • (2-5) Problem Solving

 Ismail has 8 bags of sweets. His little brother ate 1.5 of the sweets and he ate 2 bags. How many bags of sweets are left?

![](_page_28_Figure_2.jpeg)

Sara bought a computer for 359.50 JOD. She had a store coupon that gave her 20.18 JOD discount. How much did Sara pay for the computer?

359.50 20.18 339.32

![](_page_29_Picture_2.jpeg)

Fawaz's tomato plants measure 205.8 cm, 145.8 cm and 199.7 cm. What is the measure of all the plants altogether?

205.8 145.8 199.7 551.3

![](_page_29_Picture_5.jpeg)

<u>Show Your Turn</u>

![](_page_30_Figure_1.jpeg)

**a)** 
$$\frac{2}{7} = \frac{7}{2}$$
 **b)**  $3\frac{1}{4} = \frac{13}{4} = \frac{4}{13}$  **c)**  $11 = \frac{1}{11}$ 

(a) 
$$3\frac{8}{10} \times 2\frac{1}{2}$$
  
 $\frac{38}{10} \div \frac{5}{2} = \frac{190}{20} = \frac{19}{2}$   
(b)  $3\frac{1}{5} \div \frac{4}{5}$   
 $\frac{16}{5} \div \frac{4}{5} = \frac{80}{20} = 4$   
(c)  $32.6+4.17$   
 $= 36.77$   
(d)  $29-5.42$   
 $= 23.58$ 

### O Convert to fractions or mixed numbers. Then simplify.

![](_page_30_Figure_6.jpeg)

![](_page_31_Picture_0.jpeg)

## Measurement and Geometry

![](_page_31_Picture_2.jpeg)

![](_page_32_Figure_0.jpeg)

- Add and subtract different metric units of length.
- Measure the volume of a rectangular prism.
- Define and identify the relationship of angle pairs.
- Find missing angle measures in angle pairs.

![](_page_33_Figure_0.jpeg)

The standard unit of length is the meter.
 We use different units to measure different lengths:

![](_page_33_Figure_2.jpeg)

![](_page_33_Figure_3.jpeg)

Step 2: Add units. 19 m+23 m+25.9 m= 67.9 m	19.0 23.0 +25.9
	67.9

![](_page_34_Figure_0.jpeg)

## O ── (3-2) Rectangular Prism Volume

A prism has 3-dimensions (6 faces). It has a length, a width and a height. The height of the prism will indicate how many layers of cubes are in the prism.

Look at the following example of a rectangular prism: Find its volume.

![](_page_35_Figure_3.jpeg)

 $V = 24 \text{ cm}^{3}$ Length (L) = 4 cm Width (W) = 3 cm Height (H) = 2 cm

Count to find the volume of each rectangular prism  $\boxed{}$  =1 cm<sup>3</sup>

![](_page_35_Figure_6.jpeg)

In the prism below the top layer is composed of four rows of five  $1 \text{ cm}^3$  blocks. Therefore, the volume of the top layer would be  $20 \text{ cm}^3$  (4x5= 20).

![](_page_36_Figure_1.jpeg)

Since there are 4 layers and each has a volume of 20 cm<sup>3</sup>, the total volume of the prism must be 80 cm<sup>3</sup>.

![](_page_36_Figure_3.jpeg)

4 layers of 20 cm<sup>3</sup>= 80 cm<sup>3</sup> **OR** 4×20 cm<sup>3</sup>= 80 cm<sup>3</sup> 5×4×4= 80 cm<sup>3</sup>

Therefore, the volume of any rectangular prism can be found with the formula:

### Volume (V)= Length x Width x Height

![](_page_36_Picture_7.jpeg)

![](_page_37_Figure_0.jpeg)

(3-3) Circles **o** —

The center of a circle is a point that's the same distance from any

![](_page_38_Figure_0.jpeg)

### To measure angles we need a tool called a 'Protractor'

- Step 1. Place the center point of the protractor on the vertex of the angle.
  - Step 2. Place the 0 mark on one side of the angle.
- Step 3. Read the measure of the angle where the other side crosses the protractor. The measure of the angle is 35°.

O Use a protractor to find the measure of the given angles.

![](_page_38_Figure_7.jpeg)

## • Pairs of angles.

In geometry, pairs of angles can relate to each other in several ways.

When two or more lines or rays intersect, pairs of angles are formed.

#### Complementary Angles

Two angles are called complementary angles if the sum of their measurements equals 90° (right angle). One of the complementary angles is said to be the complement of the other.

### Supplementary Angles

Two angles are called supplementary angles if the sum of their measurements equals 180° (straight angle). One of the supplementary angles is said to be the supplement of the other.

### • Vertical Angles

Two pairs of angles are formed by two intersecting lines. Vertical angles are opposite angles in such an intersection. Vertical angles are equal to each other.

## Knowing the relationship of angle pairs will help you calculate the measurement of the angles. Review with a classmate the following example:

The measurement of <dbe= 90°<="" th=""><th>because it is a vertical angle</th></dbe=>	because it is a vertical angle
The measurement of <gbc= 60°<="" td=""><td>because <u>90°- 30° = 60°</u></td></gbc=>	because <u>90°- 30° = 60°</u>
The measurement of <gba= 120°<="" td=""><td>because &lt;<u>ABD = 60° so 180°- 60°</u> = 120</td></gba=>	because < <u>ABD = 60° so 180°- 60°</u> = 120
The measurement of $< DBC = 120^{\circ}$	because 90°+ 30°=120°

![](_page_39_Picture_11.jpeg)

![](_page_39_Picture_12.jpeg)

![](_page_39_Figure_13.jpeg)

![](_page_39_Figure_14.jpeg)

![](_page_39_Figure_15.jpeg)

909

## • Find the measure of each angle.

![](_page_40_Figure_1.jpeg)

#### (3-6) Problem Solving **O** —

Bashar rode 2 kilometers on his bike. His sister Lana rode 3000 meters on her bike. Who rode the farthest and by how much? 3000 m = 3 kmLana rode farthest because 3 km > 2 km

Manal has a box whose length is 12 cm, height 8 cm, and width 6 cm. What is the volume of the box?

Zaid is planting grass on the ground where his gazebo stands. If the radius of the gazebo is 2 meters, what is the total area that needs grass? 12.56 m

Tawfig is 143 centimeters tall and Khaldon is 1.35 m. Who is taller?

143 cm = 1.43 m1.43 > 1.34 Tawfig is taller

Maya bought a fish tank with measurements of: Length 50 cm Width 30 cm Height 4 dm What is the volume of the fish tank?  $4 \, dm = 40 \, cm$ 

 $40 \times 50 \times 30 = 60000 \text{ cm}^3$ 

![](_page_41_Picture_9.jpeg)

![](_page_41_Picture_10.jpeg)

![](_page_41_Picture_11.jpeg)

![](_page_41_Picture_12.jpeg)

![](_page_41_Picture_13.jpeg)

![](_page_42_Figure_0.jpeg)

## • Look at the figure and answer the questions, some of the answers are in the box below.

![](_page_43_Figure_1.jpeg)

1 The figure formed by two rays from the same endpoint is an

\_\_\_\_angle\_\_\_\_.

- 2 The basic unit in which angles are measured is the <u>Degrees</u>
- **3** The instrument used to measure angles is a <u>Protractor</u>.
- 4 The vertex of <AEC is <u>accute</u>
- 5 An angle whose measure is between 0° and 90° is an

<u>acute</u>angle.

6 An angle whose measure is between 90° and 180° is an

obtuse angle.

**7** <CEF has a measure of 90° and is called a <u>right</u> angle.

8 < CED is called a <u>obtuse</u> angle.

**9** Two acute angles in the figure are  $\_$  < A E C  $\_$  and  $\_$  < D E B  $\_$ .

**10** Two complementary angles in the figure are <u>< FEB</u> and

< BED

11 Two supplementary angles in the figure are  $\underline{< C E F}$  and

< FED .

**12** Two vertical angles in the figure are <u>< C E A</u> and

![](_page_44_Picture_8.jpeg)

7  $sin(-\alpha) = 2$ v (+y = x+2)(12-a) \* (4+b) = 202x = x + 2 - yGEBRA 12 - a = 20(4+b)x = 2-Y 12 - a = 5b 5 12b-ab = >1 126 =  $log_b n = a \notin b^a = n$  $log_a(y) = -log_a(x)$ C  $log_{a}(y) = log_{a}(x^{-1})$ x = 109 b Y \*\* y = x C  $\gamma = f(x)$ A2+B2=C2 B

# Algebra

![](_page_45_Picture_2.jpeg)

![](_page_46_Picture_0.jpeg)

- Equation
- Evaluate algebraic expression
- Solving equations

## **O**bjectives

![](_page_46_Picture_5.jpeg)

- Identify Algebra
- Differentiate between expression and equation
- Combine like terms in expressions
- Idenify equivalent expressions in equations
- Solve one-step equations

![](_page_46_Picture_11.jpeg)

## • (4-1) Introduction of Algebra

Algebra is a type of mathematics that uses letters—called variables, to represent quantities.

Juan has 4 dollars. He wants to buy a cd for 11 dollars. How much more money does he need?

4+ 7 = 11  $\rightarrow$   $4+\chi=11$ 

### • Write an algebraic expression for the word expression.

The sentence	The expression
Add y to number 8.	y+8
Subtract 14 from $\chi$ .	<i>X</i> -14
The product of 4 and a.	4 a
30 more than S.	30 + S
Subtract 5 from 4 times C.	4 c - 5
30 divided by C.	30 ÷ c
8 times the product of 5 and $\chi$ .	8 × (5×)
15 less than V.	V-15

An expression is a phrase that includes at least one variable.

5(x+3)4x+6-2v

An equation is an algebraic or numerical sentence that shows two quantities are equal.

**Example:** 

4x + 2 = 11b-5 = 30 O Circle each of the following as an expression or an equation.

![](_page_48_Figure_1.jpeg)

![](_page_48_Picture_2.jpeg)

 $\bigcirc$  Write a formula to give the perimeter (p) of a square with side length (S).

p = 45

![](_page_48_Picture_5.jpeg)

## • (4-2) Evaluate Algebraic Expressions

To evaluate an algebraic expression, substitute numbers for the variables and then follow the order of operations. Evaluate the expression (12+3y) when (y=2)12+3y (substitute 2 for y) =12+3(2)(using order of operations) =12+6=18Evaluate the expression for the given value of the variable. a) x-9 when x = 11b) 2w+7 when w=1011 - 9 = 22(10) + 7 = 20 + 7 = 27c)  $p^2+5$  when p=6d) 10-3f when f=310 - 3(3) = 10 - 9 = 1 $6^2 + 5 = 36 + 5 = 41$ e)  $(15-x) \times 2$  when x = 5f) 6+q+2 when q=8 $(15 - 5) \times 2 = 10 \times 2 = 20$  $6 + 8 \div 2 = 6 + 4 = 10$ 

- a) Find the value of K that makes the expression (2k) less than 7.
   Discuss your answer. 7 2k
- b) How much greater is the perimeter of a square with a side length (6 cm) than a square with a side length of (5 cm)?

 $6 \times 4 = 24$  cm

Your Work

 $5 \times 4 = 20$  cm It is greater by 4 cm

## (4-3) Solving Equations

A solution of an equation is a value of a variable that makes an equation true.

x+4=9 (x=5 is the solution of the equation, because 5+4=9).

To solve an equation like y-3=5, you must isolate the variable

get the variable by itself on one side of the equation.

The equivalence of the equation should be maintained by performing inverted operations on each side.

![](_page_50_Figure_6.jpeg)

- Show Your Turn -

• Tell whether each item below is an equation or expression.

9-n=15	equation
9b	expression
2c= 48+a	exquation

• Match the following questions with their corresponding values for 'y'.

![](_page_51_Figure_4.jpeg)

### • Tell whether each algebraic equation is correct. Write true or false next to each.

1.
$$a - 6 = 4$$
, $a = 10$ T5. $2x + 7 = 16$ , $x = 4$ F2. $\frac{C}{12} = 12$ , $c = 6$ F6. $\frac{30}{5} = h$ , $h = 6$ T3. $\frac{d}{6} = 3$ , $d = 18$ T7. $\frac{8}{i} = 1$ , $i = 8$ T4. $8z = 48$ , $z = 7$ F8. $13 - z = 8$ , $z = 4$ F

### O Circle the equation that represents each situation.

![](_page_52_Picture_1.jpeg)

Asad has w golf tees in his bag. His sister has 4 times as many tees as Asad does. His sister has 36 tees.
 Which equation illustrates this situation?

a)	a) $\frac{w}{4} = 36$ b) $\frac{4}{w} = 36$	
c)	c) $36w=4$ d) $4w=36$	
0	• What is the value of w?	
		With Co

![](_page_53_Picture_0.jpeg)

# Probability

![](_page_53_Picture_2.jpeg)

## Vocabulary

- Random experiment
- Sample space
- Event
- Probability
- Experimental probability
- Theoretical probability

## **O**bjectives

![](_page_54_Picture_8.jpeg)

- Identify the random experiment.
- Find the sample space of a random experiment.
- Identify the event of a random experiment.
- Distinguish between experimental and theoretical probabilities.
- Find the probability of a random experiment event.

![](_page_54_Picture_14.jpeg)

## (5-1) Random Experiment and Events

**Random experiment** is an experiment which the outcome cannot be predicted with certainty.

For examples: throwing a coin and recording the face, throwing a dice and recording the face, and the result of a football match.

The sample space (S) of a random experiment is the set of all possible outcomes.

### • Find the sample space of each random experiment.

• Throwing a dice and recording the face.

S={1, 2, 3, 4, 5, 6}

• The result of an examination.

S= \_\_\_\_ Pass / Fail

• Throwing two coins.

S= <u>Heads / Fail</u>

Selecting a ball from a box having numbered balls from 1 to 10.

Your Work

![](_page_55_Picture_14.jpeg)

a box with one yellow ball, one blue and one red {yellow, blue, red}

## • (5-2) Probability

### An event is a subset of the sample space.

### For example:

- Tossing a coin and it landing on heads.
- Rolling a number > 4 on a dice.
- Tossing two coins and landing numbers of tails.

### Probability is the chance that an event will take place.

• **For example**: if you toss a coin, there is a 50 percent chance that it might be heads (H) or tails (T).

## The chances of any event can be shown on a probablity scale from 0 to 1:

- A probability of 0 tells us that an event will never happen.
   It's impossible (example: rolling a "7" on a dice).
- A probability of 1 tells us that the event is certain to happen.
   (example: rolling a number less than "7" on a dice).

![](_page_56_Figure_11.jpeg)

To find out probability, use the following equation:

Theoretical probability= P(E)=

number of sample space

number of successful

**Experimental Probability and Theoretical Probability** 

**Experimental Probability** is found by repeating an experiment and observing the outcomes.

P (event) \_\_\_\_\_\_ number of times an event occurs total number of trials

![](_page_57_Figure_3.jpeg)

**Theoretical Probability** is what is expected to happen bassed on mathematics.

P (event) = number of favorable outcomes

![](_page_57_Figure_6.jpeg)

![](_page_58_Figure_0.jpeg)

• In the space below, draw a tree diagram that shows results of tossing a coin three times.

ннн	тнн
ннт	ТНТ
нтн	ТТН
нтт	ттт

• What is the probability of getting at least 2 heads?

![](_page_58_Picture_4.jpeg)

• Toss a coin 10 times and record your outcomes in the chart.

Then, answer the questions below.

- Before you toss, try to make a prediction:
- How many times do you think it will land on a head side? \_\_\_\_\_times.
- How many times do you think it will land on a tail side? \_\_\_\_\_times.

Toss of coin	Head	Tails	Toss of coin	Head	Tails
1			6		
2			7		
3			8		
4			9		
5			10		

How many times did it land on heads? \_\_\_\_\_5 times express it as a fraction \_\_\_\_\_5, and a percentage \_\_\_\_\_.

#### 50 90

How many times did it land on tails?\_\_\_\_\_ times express it

as a fraction \_\_\_\_\_, and a percentage \_\_\_\_\_.

## • Working out the probability of rolling a dice.

Example: 1

What is the probability of getting a 3 when you roll a dice?

There are six possible outcomes:
 .
 .
 .

 Only one outcome is successful, the 3. We make a fraction to work it out:

Probability of \_\_\_\_\_\_number of successful outcomes\_\_\_\_\_\_ getting a 3 \_\_\_\_\_\_number of sample space

 $\frac{\bullet}{\bullet} = \frac{1}{6}$ 

The probability of getting a 3 is  $\frac{1}{6}$ .

The probability of getting any of the numbers on a dice is  $\frac{1}{6}$ . They are all equally likely.

🕨 Example	ble: <mark>2</mark>
	<ul> <li>What is the probability of getting an even number when you roll a dice? there are 6 numbers on a dice. There are 3 even numbers (2, 4 and 6).</li> </ul>
	$\frac{\text{Number of successful outcomes}}{\text{number of sample space}} = \frac{3}{6} = \frac{1}{2}$
	Spark Meth 20
	what is the probability of getting an even number when you fold a dice? there are 6 numbers on a dice. There are 3 even numbers (2, 4 and 6). $\begin{array}{c} \bullet \bullet$

## In rolling a dice experiment, find the following probabilities and write the answer as a fraction.

- The probability of getting a 6 is  $\underline{\phantom{0}}$
- The probability of getting an odd number 2 = 6.
- The probability of getting a number greater than 5 is \_\_\_\_\_
- The probability of getting a number divided by 3 is  $\frac{2}{6} = \frac{1}{2}$ .

## Your Work

- Find the sample space of rolling a dice twice.
   Then find the probability of:
- Getting number "8" as a sum of the two faces.
- Getting a sum greater than "8".

## Show Your Turn

Samer and Fahd tossed two dice 50 times, and note the sum of the rolls of the two dice. Their outcome was the following:

3	5	5	4	6	7	7	5	9	10
12	9	6	5	7	8	7	4	11	6
8	8	10	6	7	4	4	5	7	9
9	7	8	11	6	5	4	7	7	4
3	6	7	7	7	8	6	7	8	9

![](_page_61_Picture_12.jpeg)

• What was their experimental probability of tossing number "5" as a sum?

6 50

• What is the theoretical probability of tossing number "5" as a sum?

$$1+4$$
,  $2+3$ ,  $\frac{1}{12} + \frac{1}{12} = \frac{2}{12}$