Year 8 Term 1 Homework

Student Name: _____	**Grade**: _____
Date: _____	**Score**: _____

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1 Year 8 Term 1 Week 1 Homework

1.1 Topic 1 — Percentages

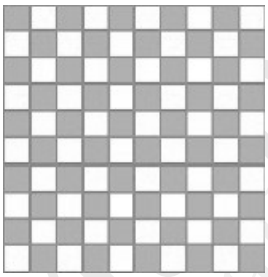
1.1.1 The Meaning of Percentages

Definition:

- The Term **per cent** means some thing out of one hundred.
- The Symbol for per cent is **%**

Example 1.1.1

1. *7% means $\frac{7}{100}$ or seven out of one hundred.*
2. *In the diagram shown, what percentage of the figure is:*



(a) Shaded?

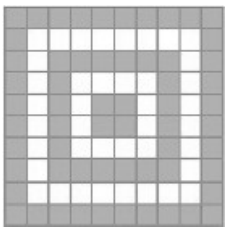
(b) Unshaded?

Solution:

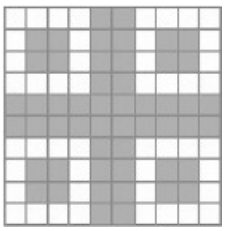
(a) 50 out of 100 squares are shaded or 50% of the figure is shaded.

(b) 50 out of 100 squares are shaded or 50% of the figure is unshaded.

Exercise 1.1.1 Each of the following square has been divided into 100 squares. State the percentage of each figure that is shaded.



(1) _____ ,



(2) _____

Exercise 1.1.2 Place each of the percentages on the number line.

1. *15%*

2. *25%*

3. *85%*

4. *90%*

Exercise 1.1.3 The inflation rate in a certain country is quoted as begin 50%.

1. *What does this mean?*

2. *If a pen cost $1.20 last year, how much would you expect it to cost this year?*

Exercise 1.1.4

1. *If 25% of the people in a crowd are children, what percentage are adults?*

2. *Charles got 76% of the words correct in a spelling test. What percentage of the words did he spell incorrectly?*

3. *If a man lost 82% of his money while gambling at the casino, what percentage of his money does he have left?*

1.1.2 Converting Between Fractions and Percentages

To covert a percentage to a fraction:

- Write the number in front of the percentage sign as the numerator and 100 as the denominator.
- Simplify if it is possible.

Example 1.1.2 Express each of these percentages as a fraction in its simplest form

1. $17\% = \frac{17}{100}$
2. $25\% = \frac{25}{100} = \frac{1}{4}$
3. $120\% = \frac{120}{100} = 1\frac{20}{100} = 1\frac{1}{5}$

Method 1:

If the denominator is a factor of 10, 100, 1000 etc:

- Convert the fraction to one with a denominator of 100.
- Write the numerator followed by a percentage sign.

Example 1.1.3 Convert each of these fractions to a percentage using method 1

1. $\frac{12}{100} = 12\%$
2. $\frac{8}{10} = \frac{8\times10}{10\times10} = \frac{80}{100} = 80\%$
3. $2\frac{3}{20} = \frac{3\times5}{20\times5} = \frac{215}{100} = 215\%$

Method 2:

If the denominator is not a factor of 10, 100 or 1000, multiply the fraction by $\frac{100}{1}\%$

Example 1.1.4 convert each of these fractions to a percentage using method 2

1. $\frac{1}{6} = \frac{1}{6} \times \frac{100}{1}\% = \frac{100}{6}\% = 16\frac{2}{3}\%$
2. $\frac{3}{7} = \frac{3}{7} \times \frac{100}{1}\% = \frac{300}{7}\% = 42\frac{6}{7}\%$
3. $3\frac{3}{8} = \frac{27}{8} \times \frac{100}{1}\% = \frac{2700}{8}\% = 337\frac{1}{2}\%$

Exercise 1.1.5 Express each of these percentages as a fraction.

1. *12%* = _____
2. *45%* = _____
3. *87%* = _____
4. *112%* = _____
5. *15.5%* = _____

Exercise 1.1.6 Express each of these fractions as a percentage.

1. $\frac{23}{100}$ = _____
2. $\frac{12}{50}$ = _____
3. $\frac{7}{20}$ = _____
4. $\frac{123}{100}$ = _____
5. $\frac{204}{200}$ = _____

Exercise 1.1.7 Convert each of these percentages to a fraction in its simplest form.

1. *2%* = _____
2. *24%* = _____
3. *38%* = _____
4. *85%* = _____
5. *24.2%* = _____

Exercise 1.1.8 Convert each of these fractions to a percentage.

1. $\frac{7}{20}$ = _____
2. $\frac{3}{25}$ = _____
3. $\frac{27}{50}$ = _____
4. $\frac{1}{4}$ = _____
5. $\frac{42}{125}$ = _____

Exercise 1.1.9 Express each integer as a percentage.

1. *2 =* _____
2. *12 =* _____
3. *22 =* _____

Exercise 1.1.10 Express each of these percentages as an integer

1. *500% =* _____
2. *800% =* _____
3. *1000% =* _____

Exercise 1.1.11 Convert these percentages to mixed numerals.

1. *125% =* _____
2. *205% =* _____
3. *624% =* _____
4. *560% =* _____
5. *108% =* _____

Exercise 1.1.12 Convert these mixed numerals to percentages.

1. $2\frac{7}{10}$ = _____
2. $1\frac{13}{20}$ = _____
3. $2\frac{1}{4}$ = _____
4. $3\frac{4}{5}$ = _____
5. $5\frac{24}{25}$ = _____
6. $24\frac{5}{8}$ = _____

1.1.3 Converting Between Decimals and Percentages

To convert a percentage to a decimal:

- convert the percentage to a fraction with a denominator of 100.
- divide the numerator by 100 by moving the decimal point two places to the left.

Example 1.1.5 Convert each of these percentages to a decimal.

1. $15\% = \frac{15}{100} = 0.15$
2. $80.5\% = \frac{80.5}{100} = 0.805$
3. $123\% = \frac{123}{100} = 1.23$

Exercise 1.1.13 Convert each of these percentages to a decimal.

1. $8\% =$ _____
2. $2.8\% =$ _____
3. $108\% =$ _____

To convert a decimal to a percentage:

- convert the decimal to a fraction with a denominator of 100.
- write the numerator followed by a percentage sign (%).

Example 1.1.6 Convert each of these decimals to a percentage.

1. $0.24 = \frac{24}{100} = 24\%$
2. $2.62 = 2\frac{62}{100} = 262\%$
3. $0.345 = \frac{345}{1000} = \frac{34.5}{100} = 34.5\%$

Exercise 1.1.14 Convert each of these decimals to a percentage.

1. $1.18 =$ _____
2. $2.02 =$ _____
3. $0.27 =$ _____

Exercise 1.1.15 Convert each of these decimals to a percentage.

1. *0.005 =* _____
2. *0.126 =* _____
3. *12.5 =* _____
4. *0.305 =* _____
5. *0.028 =* _____
6. *123.456 =* _____

Exercise 1.1.16 Convert each of these percentages to a decimal.

1. $5\frac{1}{2}\% =$ _____
2. $35\frac{3}{4}\% =$ _____
3. $52\frac{3}{5}\% =$ _____
4. $18\frac{1}{10}\% =$ _____
5. $66\frac{4}{25}\% =$ _____
6. $74\frac{4}{5}\% =$ _____

1.1.4 Common Conversions

The following conversions between fractions, decimal and percentages should be memorised for use in later problems.

Fractions	Decimals	Percentages	Fractions	Decimals	Percentages
$\frac{1}{10}$	0.1	10%	$\frac{1}{5}$	0.2	20%
$\frac{1}{8}$	0.125	12.5%	$\frac{2}{5}$	0.4	40%
$\frac{1}{4}$	0.25	25%	$\frac{3}{5}$	0.6	60%
$\frac{1}{3}$	$0.\dot{3}$	$33\frac{1}{3}\%$	$\frac{4}{5}$	0.8	80%
$\frac{1}{2}$	0.5	50%			
$\frac{2}{3}$	$0.\dot{6}$	$66\frac{2}{3}\%$			
$\frac{3}{4}$	0.75	75%			

1.2 Topic 2 — Algebra

Algebra terms with identical pronumerals are called **like terms**. Only like terms can be added or subtracted.

To combine the like terms in an algebra expression:

- add or subtract the co-efficients
- keep the same pronumeral(s).

1.2.1 Adding and Subtracting Like Terms

Example 1.2.1

1. $12b + 3b = 15b$
2. $12ab - 6ab = 6ab$
3. $2x + 5x - 3x = 4x$
4. $x^2 - y - 4x^2 + 6 = -3x^2 - y + 6$

Exercise 1.2.1

1. $6pq + 2p - 2pq + 3q =$ _____
2. $2x^2 + 5x + 3x^2 - 6x =$ _____
3. $7k - 3 + 3k + 2 =$ _____
4. $3m - 2n + 6m - n =$ _____
5. $-2pq + 5 + 4pq - 9pq =$ _____
6. $6xy + 4 - 4xy - 7y =$ _____
7. $-2x^2 - y - 4x^2 + 5y =$ _____
8. *A rectangle has length 3x cm and width 5y cm. Find:*
   (a) *its area in terms of x and y* _____
   (b) *its perimeter in terms of x and y* _____
   (c) *the area of the rectangle if x = 4.2 cm and y = 6.5 cm* _____

1.2.2 Multiplying Algebraic Terms

To multiply algebraic terms:

- multiply the co-efficients
- multiply the pronumeral(s).

Example 1.2.2 Evaluate the following expressions:

1. $3a \times 4b = 12ab$
2. $\frac{1}{4} \times 16pq = 4pq$
3. $(-3x) \times (-6y) = 18xy$
4. $\frac{3x}{4} \times \frac{y}{12} = \frac{xy}{16}$

Exercise 1.2.2 Simplify these expressions:

1. $3a \times 4b \times 5c =$ _____
2. $12x \times 7y =$ _____
3. $20x \times \frac{1}{4} =$ _____
4. $(-2a) \times (-3b) \times (-4c) =$ _____
5. $3mn \times 5mp =$ _____
6. $6ab \times 7bc \times 4ac =$ _____
7. $(-2a) \times (-3ab) \times (-5bc) =$ _____
8. $12 \times (-3xy) \times 2y =$ _____

1.2.3 Dividing Algebraic Terms

To divide algebraic terms:

- express the division in fraction form
- divide the co-efficients
- divide the pronumerals.

Example 1.2.3 Simplify the following expressions:

1. $\frac{25mn}{5m} = 5n$
2. $\frac{21p^2q}{7p} = 3pq$
3. $\frac{36xy}{6y} = 6x$
4. $42xy \div 7x = \frac{42xy}{7x} = 6y$
5. $32abc \div (-8ac) = \frac{32abc}{(-8ac)} = -4b$

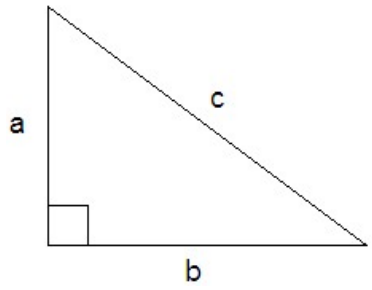
Exercise 1.2.3

1. $\frac{5a}{5}$ = _____
2. $\frac{4b}{b}$ = _____
3. $\frac{35xy}{y}$ = _____
4. $\frac{32xyz}{8xz}$ = _____
5. $\frac{24pq^2}{6q}$ = _____
6. $28abc^2 \div 7ac$ = _____
7. $56k^2 \div 8k$ = _____
8. $-15p^2 \div (-3p)$ = _____
9. $x^2y \div xy^2$ = _____
10. $25mn^2 \div 5m^2n$ = _____

1.3 Topic 3 — Pythagoras' Theorem

1.3.1 Pythagoras' Theorem

The longest side on a right-angle triangle is called the **hypotenuse**.

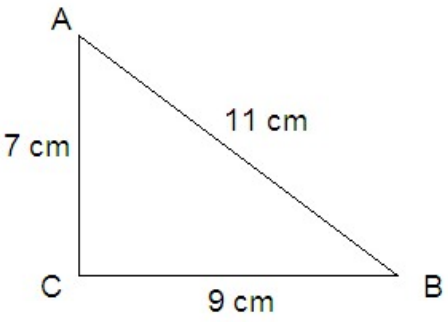


In any right-angle triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.
This can be written as: $c^2 = a^2 + b^2$

1.3.2 The converse of Pythagoras' Theorem

If the square on one side of a triangle to the sum of the squares on the other sides, then the angle between the two short sides is a right angle.

Example 1.3.1 Determine whether this triangle is right-angled.



Solution: $11^2 = 7^2 + 9^2$

$121 = 49 + 81$

which is not true,

$\therefore \triangle ABC$ *is not right-angled*

1.4 Miscellaneous Exercises

Exercise 1.4.1 Convert each percentage to a fraction in its simplest form.

1. *0.7%* = _____
2. *2.4%* = _____
3. *28.5%* = _____
4. *86.2%* = _____
5. $\frac{3}{4}\%$ = _____
6. $2\frac{1}{3}\%$ = _____
7. $6\frac{4}{5}\%$ = _____
8. $11\frac{1}{4}\%$ = _____

Exercise 1.4.2 Convert each of these decimals to a percentage.

1. *1.2* = _____
2. *1.24* = _____
3. $3.\dot{3}$ = _____
4. $8.\dot{6}$ = _____
5. *2.125* = _____

Exercise 1.4.3 Convert each the following percentages to a decimal.

1. $125\frac{1}{2}\%$ = _____
2. 185% = _____
3. $126\frac{2}{3}\%$ = _____
4. *475%* = _____
5. *225%* = _____

Exercise 1.4.4 Simplify the following expressions:

1. $3a^2 - 4bc - 2a - a^2 + 2bc + 6b =$ _____
2. $32u^2v \div 4uvw =$ _____
3. $x^2yz \div xy^2z =$ _____
4. $6ab \times 3ac \div 2ac =$ _____
5. $49pk \div 7p^2 =$ _____
6. $\frac{5u}{21} \times 7uv =$ _____
7. $\frac{x}{3} \times \frac{y}{6} =$ _____

Exercise 1.4.5

1. *Emma has 3m pencils. Alice has 4 times as many pencils as Emma. How many pencils do they have altogether?*

   _____

   _____

2. *Addison went shopping with $p. She brought 5 T-shirts which cost $q each. How much money had she left?*

   _____

   _____

3. *Nicholas earns $61.60 for working 8 hours. How much would Nicholas earn if he worked 35 hours at this wage rate?*

   _____

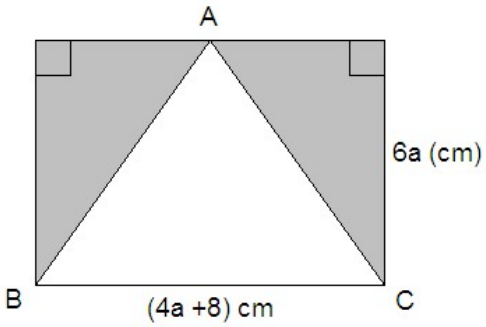
   _____

4. *15 years ago, Bob was 8m years old. How old was Bob 3m years ago?*

   _____

   _____

Exercise 1.4.6 The $\triangle$ABC is a isosceles triangle in the figure shown below. Find the area of the shaded region in terms of a. Express your answer in its simplest form.



Exercise 1.4.7 Adam has \$x. Bob has \$12y more than Adam. Cathy has \$4z less than Bob.

1. *Find Cathy's money in terms of x, y and z.*

2. *Find the total amount of money they have altogether in terms of x, y and z.*

3. *If x = 100, y = 4 and z = 6, who has the most?*

4. *Find the difference between the most amount and the least.*