

Year 8 Term 1 Math Homework

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

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1 Year 8 Term 1 Week 1 Homework

1.1 Topic 1 — Percentages

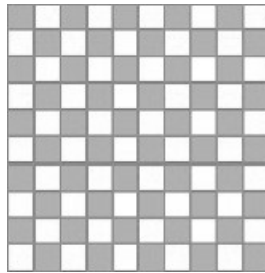
1.1.1 The Meaning of Percentages

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:

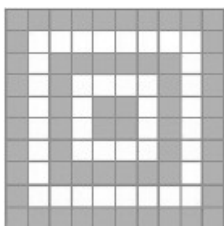


- (a) Shaded?
- (b) Unshaded?

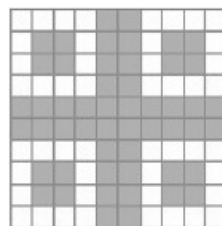
Solution:

- (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% 0% 100%



2. 25% 0% 100%



3. 85% 0% 100%



4. 90% 0% 100%



Exercise 1.1.3 The inflation rate in a certain country is quoted as being 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 convert 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. $\frac{8}{10} = \frac{8 \times 10}{10 \times 10} = 80\%$

3. $2\frac{3}{20} = \frac{3 \times 5}{20 \times 5} = \frac{215}{100} = 215\%$

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. $1\frac{11}{20} =$ _____

3. $2\frac{1}{4} =$ _____

4. $3\frac{4}{5} =$ _____

5. $5\frac{24}{25} =$ _____

6. $24\frac{2}{9} =$ _____

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. $123.456 =$ _____

5. $0.305 =$ _____

6. $0.028 =$ _____

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. $-15p^2 \div (-3p) =$ _____

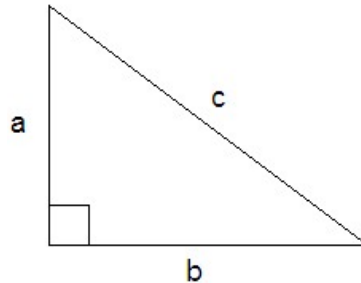
9. $x^2y \div xy^2 =$ _____

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**.



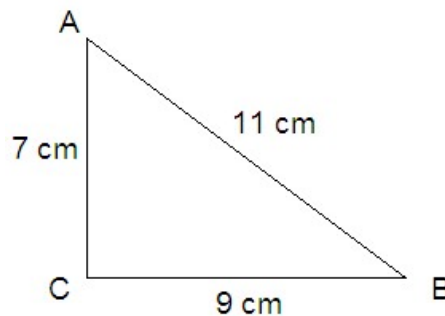
In any right-angle triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

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 is equal to the sum of the squares on the other two 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

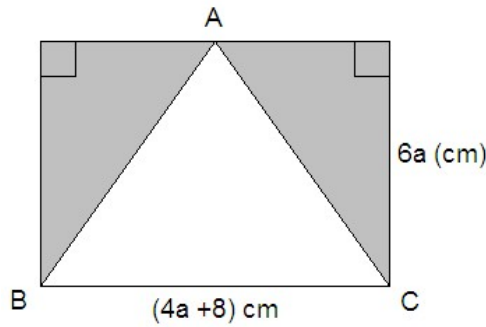
1. Emma has $3m$ pencils. Alice has 4 times as many pencils as Emma. How many pencils do they have altogether?

2. Addison went shopping with $\$p$. He brought 5 T-shirts which cost $\$q$ each. How much money had he 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.
