Week 11/12
Term 2
2020

HAWKER COLLEGE
Engage | Inspire | Achieve

EM1 Learning Brief:
Measurement

Goals

What is Perimeter?

The perimeter is the distance all the way around the outside of a 2D shape, space or area.
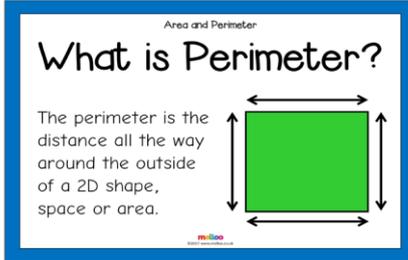
Weekly Goals:

- use metric units of length, their abbreviations, conversions between them, and appropriate levels of accuracy and choice of units (EMA17)
- estimate lengths (EMA18)
- convert between metric units of length and other length units (EMA19)
- calculate perimeters of familiar shapes, including triangles, squares, rectangles, and composites of these (EMA20)

TEST 1 will be given this week – further details to come on Google Classroom.

Theoretical Components

Resources:

PDF file - Week 11 Notes and Exercises and Mathspace.co

Knowledge Checklist

- Estimating length
- Using metric measures of length
- Converting between units of length
- Other units of length
- Calculations involving perimeter

Order

1. Work through the Week 11 notes and watch and videos or solutions posted by your teacher.
2. Complete the 4 Exercises
3. Do any mathspace.co task by the due date
4. Complete the Portfolio Task and submit on Google Classroom by the due date
5. Do any Google Forms required by the due date
6. Email your teacher if you have any questions or specific concerns and join the Google Meets as invited

Practical Components

There are 4 Exercises in this week's booklet. Read any notes and worked examples before you begin.

It is not necessary to print the booklet as you can record your answers on the Google document that will be uploaded.

A weekly Google form (Quiz) and mathspace.co task(s) **may** also both be used to check your engagement and progress each week.

Remember to check regularly Google Classrooms and mathspace.co

https://mathspace.co/teacher/task-report/TopicCustomTask-312838/questions/

Portfolio Task

The Portfolio Task may be found at the end of the Notes and Exercises Google document

ESTIMATING LENGTH

It is quite easy to estimate lengths without a ruler. Our body parts can act as a ruler for us. If you enter the length of your little finger, width of your palm, length of your shoe and the length of your stride into the memory on your phone you will always have them with you to estimate length.

Some Useful Body Lengths

Length of little finger	5 cm
Length of thumb	3 cm
Width of palm	8 cm
Hand span	21 cm
Shoe length	30 cm
Length of stride	50 cm

Some other useful lengths

Length of a $50 note	15 cm
Length of an A4 sheet of paper	30 cm

Example

Paula is estimating the length of a table. She counted that it was 5 of her shoes long. Approximately how long is the table?

If our shoe is approximately 30 cm long then the table is 5 x 30 = 150 cm long.

Exercise 1

Q1. Emma's veranda is 8 shoe lengths wide. Approximately how many centimetres wide is Emma's veranda?

How did you work this out?

Q2. Complete the missing entries in the table.

	Item	Length of body part or other useful measures	Approximate length in cm
a	Children's story book	4 little fingers	
b	Length of work bench	8 $50 notes	
c	Height of a cake	2 thumbs	
d	Height of skateboard jump	2 lengths of an A4 sheet	
e	Child's height	3.5 hand spans	
f	The distance across the room	11 paces	

The Metric System

Using body parts to estimate lengths can be convenient but it's not very accurate. In the late 18th century the French Academy of Sciences developed a standardised measurement system to replace the wide range of complicated, different and unrelated measurements that existed at the time. This new system was based on standard units and powers of 10. This is the metric system.

In the metric system, the metre is the basic unit for measuring length. Originally one metre was defined as to be one ten-millionth of the distance from the equator to the North Pole at sea level. All other length measurements are based on the length of 1 metre.

Everything in maths that relates to the 'real world' has units. If there is a point to it there are units attached to it. Sometimes the units could be people, buildings, cars, food, shapes. Basically units relate to the **what** in mathematics, and you should **always** use them. This helps to convey a clear message to the reader about **what** you are talking about.

There are some units we need to know about formally, and how to convert between them.

LENGTH/DISTANCE → *mm, cm, m, km*

AREA → mm^2, cm^2, m^2

VOLUME → *ml, L, kL, ML*

WEIGHT → *mg, g, kg, metric ton*

TIME → *s, mins, hrs, days, weeks, months, years*

Common Length Measurements

Distances are usually measured in one of the following units

Millimetres (mm)
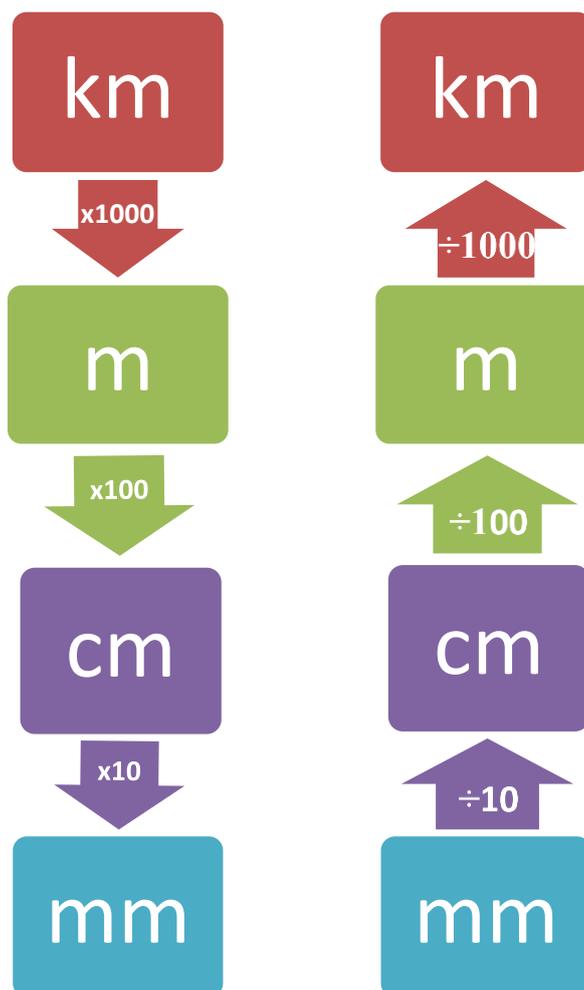
Centimetres (cm)

Metres (m)

Kilometres (km)

You would be used to most of these through previous experiences in measuring heights, lengths, drawing with your rulers, measuring objects or distances between places.

1cm = 10mm

1 m = 100cm = 1000mm

1km = 1000m = 100 000cm = 1 000 000mm

km	**km**
↓ x1000	↑ ÷1000
m	**m**
↓ x100	↑ ÷100
cm	**cm**
↓ x10	↑ ÷10
mm	**mm**

To move from larger length units to smaller length units multiply by the appropriate number for each step (10, 100, 1000)

To move from smaller length units to smaller length units divide by the appropriate number for each step (10, 100, 1000)

Copy the above conversion flow chart into your notebook.

Example

1. Change 6.4km into cm.

I suggest moving through each step.

Km → m → cm
6.4 → 6.4 x 1000 m
→ 6400m → 6400 x 100cm
→ 640 000cm

2. Convert 148900mm into m: 148900 ÷ 10 (into cm) ÷ 100 (into m) = 148.9m

Exercise 2

Q1.

a) 48mm = _____ = _____ cm

b) 41.5cm = _____ = _____ mm

c) 74mm = _____ = _____ cm

d) 64.8cm = _____ = _____ mm

e) 505cm = _____ = _____m

f) 7557m = _____ = _____ km

g) 2.843km = _____ = _____

h) 8.26m = _____ = _____cm

Q2. Every morning Scott goes to swimming training. This morning Scott completed 78 laps at training. Each lap was 50 m long.

a) How many metres did Scott swim this morning?

b) How many kilometres did Scott swim at training this morning?

c) Scott's coach wants him to swim 4.5 km tomorrow. How many laps of the 50 m pool will Scott have to complete to swim 4.5 km?

Q3. In first class competitions, cricket pitches are 22.6 m long. During a test match Grant ran the length of the pitch 137 times.

a) Calculate the length he ran in metres.

b) Calculate the length he ran in kilometres, correct to two decimal places.

Converting Between and Other Metric Units of Length

Even though the metric system is used widely, there are times and places where we use non-metric lengths. Distances at sea and in the air are commonly reported in nautical miles. The depth of water can be reported in fathoms, while many people still use miles, yards, feet and inches to measure distances.

Unit	Metric equivalent	How the unit is used
1 Inch	2.54 cm	Small lengths
1 Foot	30.48 cm	Small lengths
1 Yard	0.9144 m	Old fashioned way to measure lengths where we would use metres today.
1 Mile	1.609 km	Large distances
1 Fathom	1.8288 m	Measure the depth of water
1 Furlong	201.168 m	A length used in horse racing
1 Nautical mile	1.852 km	Measure long distances across water or in the air

Exercise 3

Q1. Complete the following statements correct to 1 decimal place.

a) 80 nautical miles = _____ km

b) 2000 feet = _____ m

c) 4 fathoms = _____ m

d) 7 miles = _____ km

Perimeter

When we measure the distance around the outside of a shape, we measure its perimeter. Home renovators use perimeter calculations to work out quantities of a variety of materials they need to order. For example, most councils require home owners to fence their block of land. The amount
of fencing materials needed and the costs are related to the perimeter of the block of land.

Example
The diagram shows Alan's block of land.
a) What is the perimeter of the block?
b) The front already has a fence but Alan needs to fence the sides and back of the block. The fencing will
cost $49 per metre. Calculate the total cost of the fence.
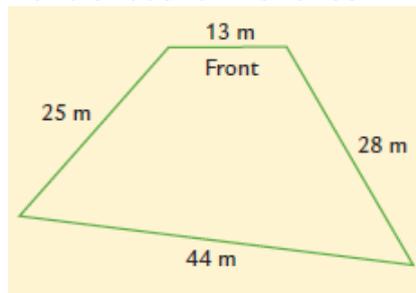
Solution
a) To calculate the perimeter, just add up all the sides.
Perimeter = 13 m + 28 m + 44 m + 25 m = 110 m
b) To calculate the length of new fence, add the three unfenced lengths.
Length = 28 m + 44 m + 25 m = 97 m
Each metre of fence costs $49. Total cost = $49 × 97 = $4753
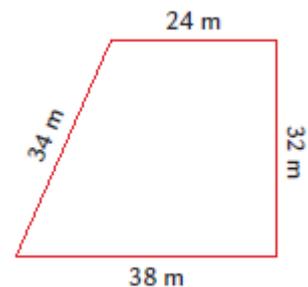
Exercise 4
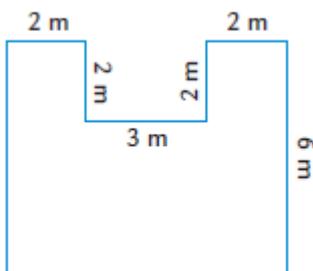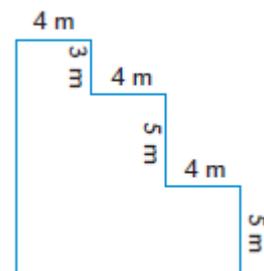Q1. Determine the perimeter of each of these blocks of land.

a)
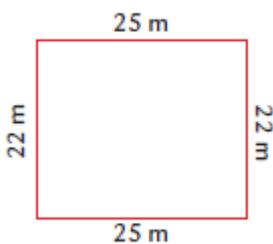
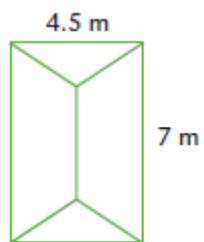

b)

2. Calculate the perimeters of these shapes.

a)

b)

3. Aaron needs to replace the guttering on every side of his garage roof. The guttering he has chosen costs
$57 per metre. How much will the guttering cost?

4.5 m

7 m

PORFOLIO TASK WEEK 11

Question 1

The average moderately active person takes about 7500 steps in a day (assume each step is 40 cm). How far will they walk in their lifetime? Support your answer with mathematics.

Question 2

Find the perimeter of this shape? Your final answer will be an algebraic expression, be sure to explain how you found it. You can assume the units used are metres and you may add other pronumerals (like x, y, z etc) to your diagram to help with your explanation.