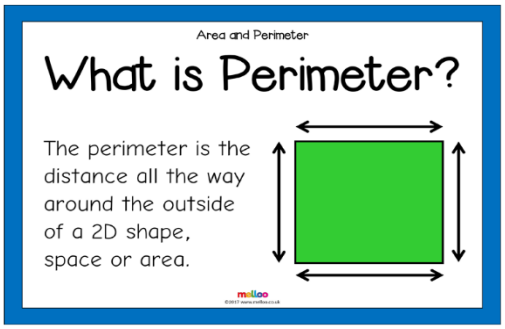
Week 12
Term 2
2024

HAWKER COLLEGE
Engage | Inspire | Achieve

EM1
Measurement

Goals



Goals for this week:

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

Theoretical Components

STEP 1

Resources:
PDF file: Week 12 Notes and Exercises
YouTube videos: Linked in the PDF file

This Week:
We will be looking at:

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

Practical Components

STEP 2
Read through Week 12 Notes and Exercises for instructions on what to do.

There are 4 Exercises in this booklet. Read any worked examples before you begin.

Remember to regularly check Google Classroom for messages.

Portfolio Task

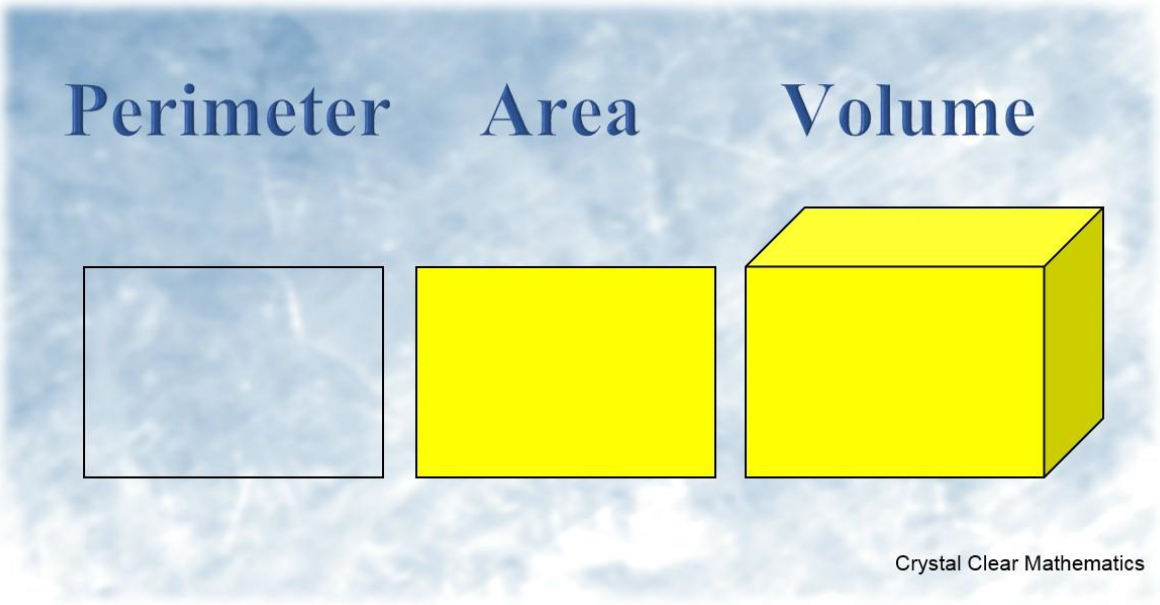
STEP 3

Complete the task at the end of the brief and submit your weekly work. 😊

Other

Remember to check Google Classroom or hawkermaths.com for each week's learning brief

Make sure you have joined the Google Classroom. If you have not, see your teacher.


Perimeter
Area
Volume
Crystal Clear Mathematics

WEEK 12 – LINEAR MEASURE

How are we ever going to use this?

- To convert different units of length
- To calculate the length of fencing
- To determine the quantities of tiles, paint and carpet
- When we need to estimate a length

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 of 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?

Solution: If our shoe is approximately 30 cm long, then the table is $5 \times 30 = 150$ cm long.

Exercise 1

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

   How did you work this out?

2. 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 (strides)	

THE METRIC SYSTEM

Using body parts to estimate lengths can be convenient but it's not very accurate. In the 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*

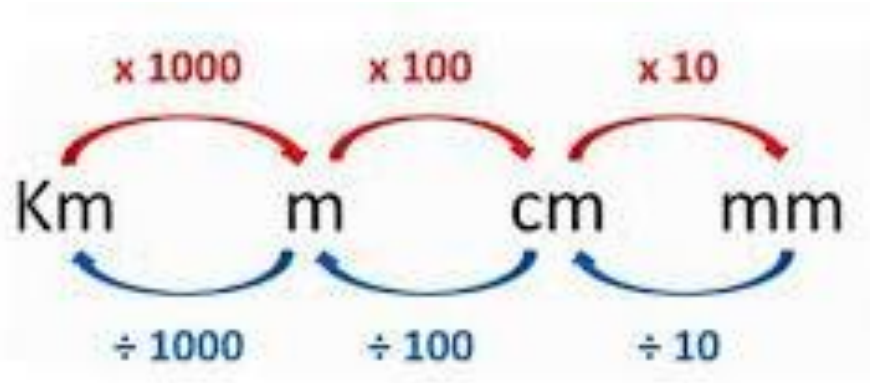
Common Length Measurements

Distances are usually measure 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 rulers, measuring objects or distances between places.

1 cm = 10 mm
1 m = 100 cm = 1,000 mm
1 km = 1,000 m = 100,000 cm = 1,000,000 mm



To move from larger length units to smaller length units, multiply by the appropriate number for each step (10, 100, 1,000)

To move from smaller length units to larger length units, divide by the appropriate number for each step (10, 100, 1,000)

Example: Change 6.4 km into cm.

Solution: km → m → cm
6.4 → 6.4 × 1,000 m
6,400 → 6,400 × 100 cm
→ 640,000 cm

Example: Convert 148,900 mm into m.

Solution: 148,900 ÷ 10 (into cm) ÷ 100 (into m) = 148.9 m

Exercise 2

1. Show working out in the first space and the answer in the second space.

   a. 48 mm = _____ = _____ cm

   b. 41.5 cm = _____ = _____ mm

   c. 74 mm = _____ = _____ cm

   d. 64.8 cm = _____ = _____ mm

   e. 505 cm = _____ = _____ m

   f. 7,557 m = _____ = _____ km

   g. 2.843 km = _____ = _____ m

   h. 8.26 m = _____ = _____ cm

2. 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?

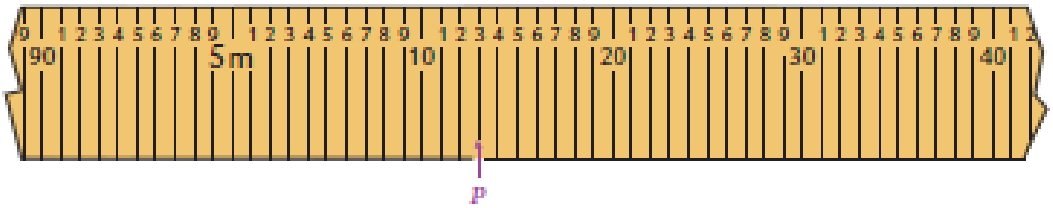
    b. How many kilometres did Scott swim at training this morning?

    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?

3. 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.

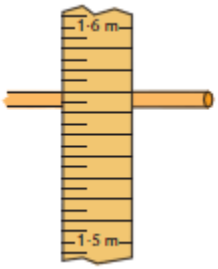
4. The diagram shows the measuring tape used in a long jump competition.



    a. Renee jumps to point P. How long is her jump?

    b. Mark these distances on the diagram above.
        i. 5 m 23 cm
        ii. 5.17 m
        iii. 498 cm
        iv. 5.04 m

5. The qualifying jump height for the girl's high jump is shown. What is the qualifying jump height? (Read from the top of the pole)



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.

Units	**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

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

    a. 80 nautical miles = _____ km

    b. 2,000 feet = _____ m

    c. 4 fathoms = _____ m

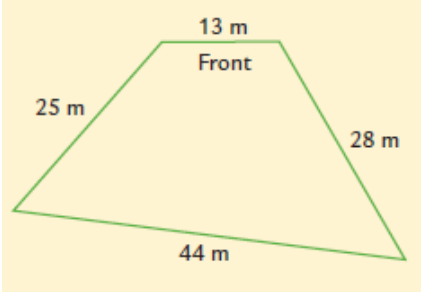
    d. 7 miles = _____ km

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 homeowners 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 $56 per metre. Calculate the total cost of the fence.



Solution:

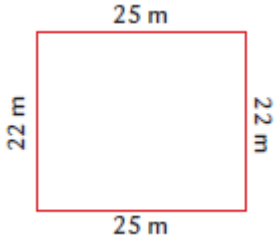
a. To calculate the perimeter, just add up all the sides.
Perimeter = 13 m + 28 m + 44 m + 25 m = 110 m

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 $56. Total cost = $5,432

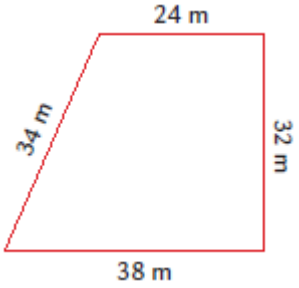
Exercise 4

1. Determine the perimeter of each of these blocks of land.

a.

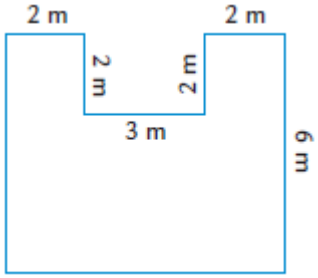


b.



2. Calculate the perimeters of these shapes.

a.



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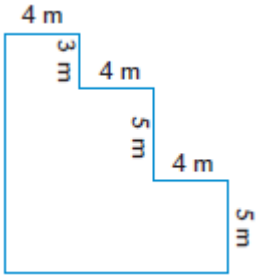
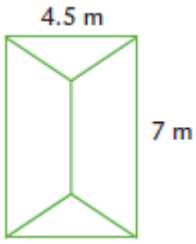
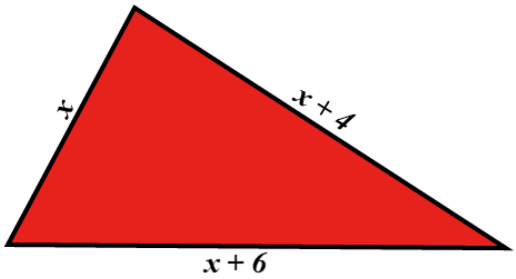


3. Sam needs to replace the guttering on every side of his garage roof. The guttering he has chosen $64 per metre. How much will the guttering cost?

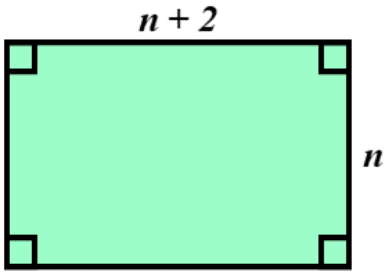


4. Find an expression, in its simplest form, for the perimeter of these shapes.

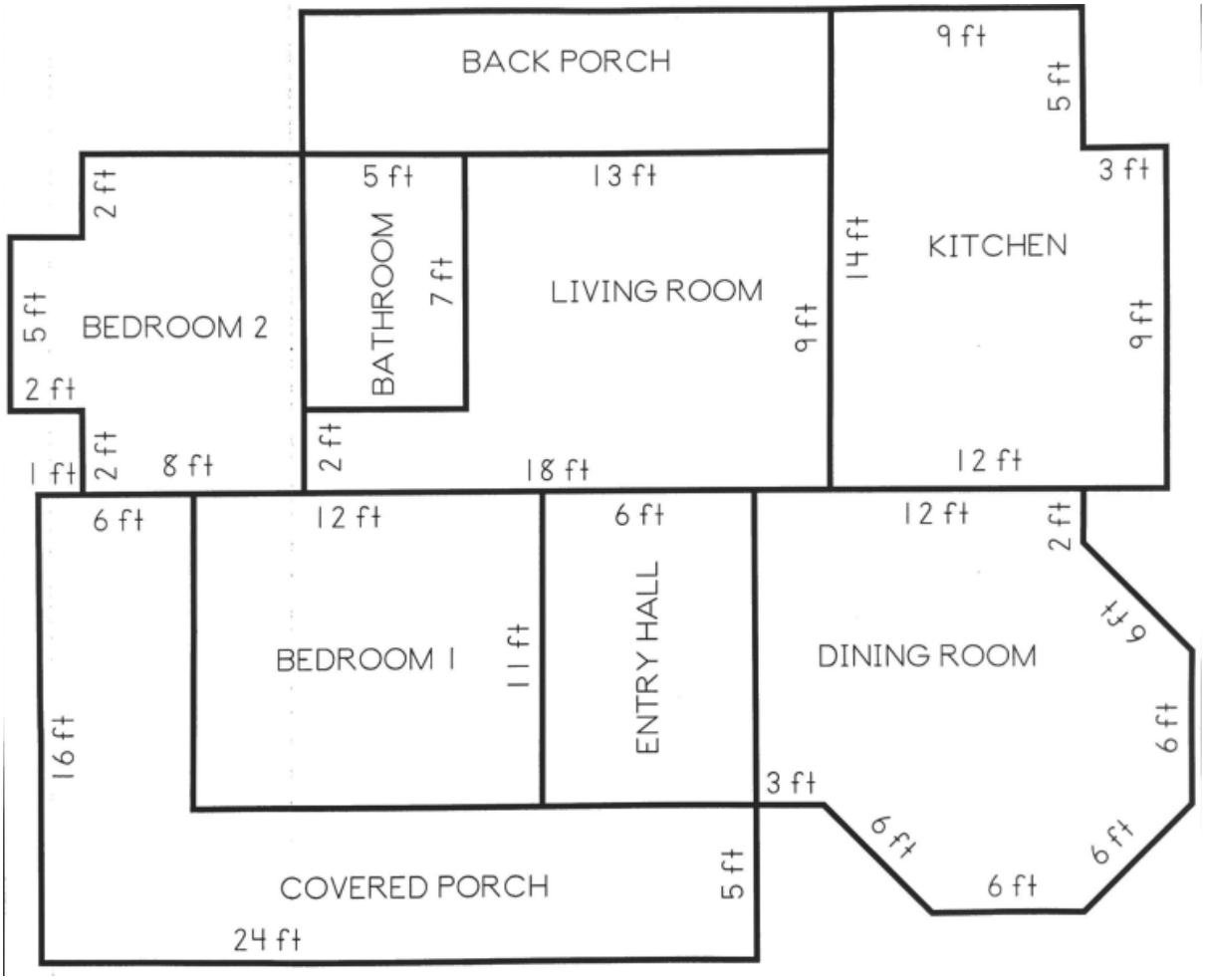
a.



b.



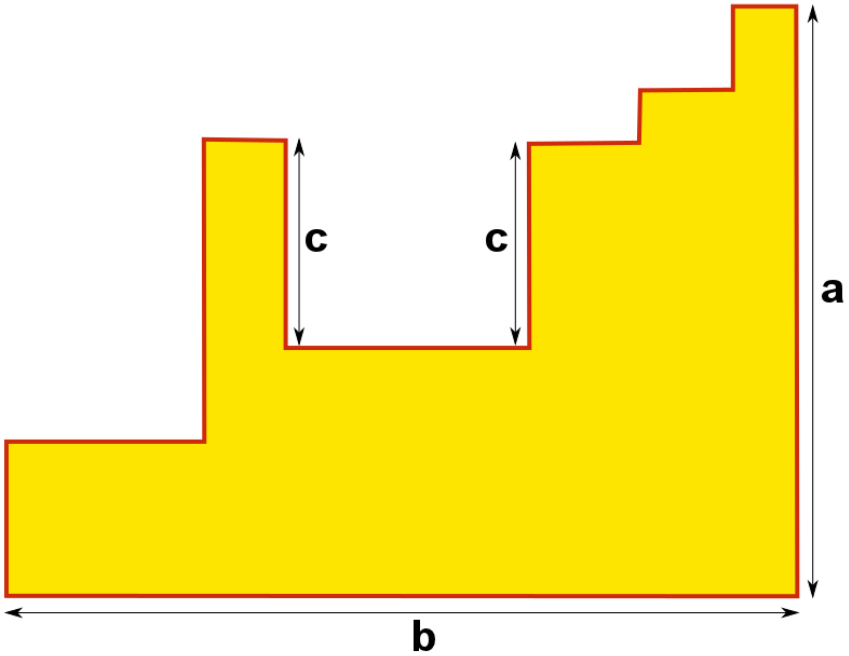
5. Find the perimeter of this house. Convert your final answer to metres. Show your working.



Week 12 Portfolio Task

1. The average moderately active person takes about 7,500 steps in a day (assume each step is 40 cm). How far will they walk in their lifetime? Support your answer with mathematics, making appropriate assumptions.

2. Find the perimeter of this shape. Your final answer will be an algebraic expression, so 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.



MARKING RUBRIC

CRITERIA	EXPECTATIONS	POSS	MULT	GIVEN	TOTAL
Practical	Student completes practical work, including exercises of the brief to an acceptable standard set by the teacher.	**2**	**3**		**/6**
Portfolio Task	Student completes the portfolio task of the week to an acceptable standard set by the teacher.	**2**	**2**		**/4**
Reasoning and Communications	Student responses are **accurate** and appropriate in presentation of mathematical ideas, with **clear** and logical **working out** shown.	**4**	**-**		**/4**
Concepts and Techniques	Student submitted work selects and applies **appropriate** mathematical modelling and **problem solving techniques** to solve practical problems, and demonstrates **proficiency** in the use of **mathematical facts, techniques** and **formulae**	**4**	**-**		**/4**
	Submission Guidelines				
Timeliness	Student submits the exercises and portfolio tasks by the set deadline. See scoring guidelines for specific details.	**2**	**-**		**/2**
		FINAL			**/20**

Student Reflection:
How did you go with this week's work?

What was interesting?

What did you find easy?

What do you need to work on?