Macmillan

Australian Curriculum

ACTIVE MATHS 7
Australian Curriculum edition

TEACHER BOOK

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**Skill sheet**

# Length, area and volume 1

Name: ................................................................................. Due date: ........../........../..........

**1** [Length units] Select the best unit (mm, cm, m, km) to measure:

**a** the width of a DVD __mm or cm__

**b** the height of a person __m or cm__

**2** [Length units] Select the best unit (mm, cm, m, km) to measure:

**a** the length of the MCG __m__

**b** the distance from Alice Springs to Canberra __km__

For **3–5**, convert the length to the unit indicated.

**3** [Length units] **a** 150 mm = __15__ cm **b** 700 cm = __7__ m

**4** [Convert length units] **a** 2.7 km = __2700__ m **b** 0.250 m = __25__ cm

**5** [Convert length units] **a** 0.457 m = __457__ mm
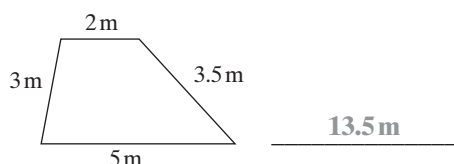
**b** 73 260 mm = __73.26__ m

**6** [Estimate lengths] Estimate the length of:

**a** a textbook

__30 cm__ **Estimates will vary.**

**b** a medium-size car
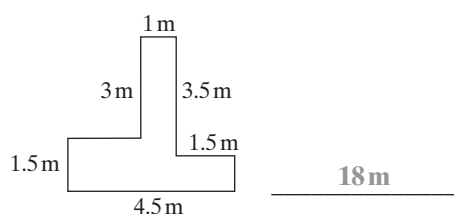
__5 m__ **Estimates will vary.**
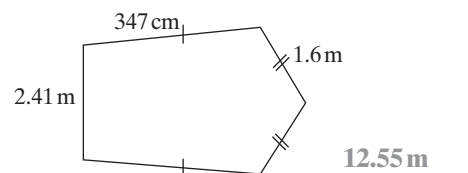
For **7–10**, calculate the perimeter.

**7** [Perimeter]

2 m, 3 m, 3.5 m, 5 m

__13.5 m__

**8** [Perimeter] (Hint: some of the measurements are missing.)

1 m, 3 m, 3.5 m, 1.5 m, 1.5 m, 4.5 m

__18 m__

**9** [Perimeter]

347 cm, 1.6 m, 2.41 m

__12.55 m__

**10** [Perimeter application]

120 mm, 200 mm, 280 mm, 0.24 m, 34 cm, 10 cm
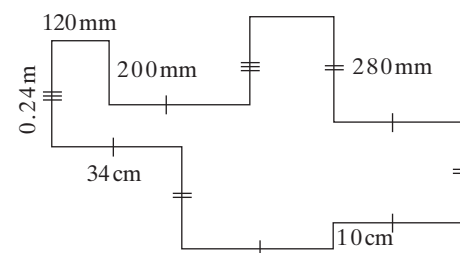
__366 cm__

**11** [Perimeter application] Max has a rectangular back yard with a perimeter of 26 m. If the yard is 9 m in length, what is the width? (Hint: draw a diagram.)

__4 m__

**12** [Perimeter application] Aisha is making a square photo frame. If each side is 23.4 cm long, calculate the perimeter of the frame.

__93.6 cm__

**13** [Perimeter application] The width of a kennel is 90 cm and the length is 1.5 m. Find the perimeter of the kennel. (Hint: draw a diagram.)
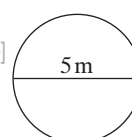
__4.8 m__

**14** [Perimeter application] Scott walked around the perimeter of a national park. He walked 2.4 km in the morning and 1.78 km in the afternoon, but still had 3.6 km to go. What is the perimeter of the park?

__7.78 km__

For **15–16**, calculate the circumference (to 1 decimal place). Use $\pi = 3.14$.
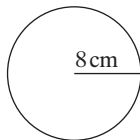
**15** [Circumference]

5 m

__15.7 m__

MEASUREMENT AND GEOMETRY
Length, area and volume

**16**
[Circumference]

8 cm

__**50.2 cm**__

**17**
[Circumference] Find the circumference of a circle of radius 5.4 m.

__**33.9 m**__

**18**
[Circumference] A trainer wheel on a child's bike has a diameter of 10 cm. Find the circumference of the wheel. (Hint: draw a diagram.)

__**31.4 cm**__

**19**
[Area units] Select the best unit ($mm^2$, $cm^2$, $m^2$ or $km^2$) to measure the area of:

**a** a sheet of paper  **b** an eraser

__**$cm^2$**__   __**$mm^2$ or $cm^2$**__

**20**
[Area units] Select the best unit ($mm^2$, $cm^2$, $m^2$ or $km^2$) to measure the area of:

**a** the classroom floor  **b** a country

__**$m^2$**__   __**$km^2$**__

For **21–22**, convert each area to the unit indicated.

**21**
[Convert area units]

**a** $7.8\,cm^2 =$ __**780**__ $mm^2$

**b** $2.1\,m^2 =$ __**2 100 000**__ $mm^2$

**22**
[Convert area units]

**a** $400\,mm^2 =$ __**4**__ $cm^2$

**b** $36\,000\,cm^2 =$ __**3.6**__ $m^2$

For **23–27**, calculate the area.

**23**
[Area rectangle]

7 m

3 m
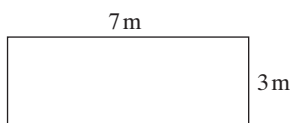
__**$21\,m^2$**__

**24**
[Composite area]

9 cm

9 cm

12 cm

5 cm

3 cm

14 cm
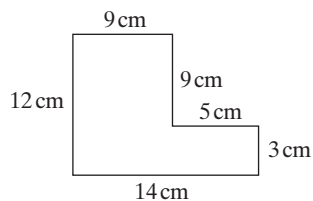
__**$123\,cm^2$**__

**25**
[Area of triangle]

5 cm

10 cm
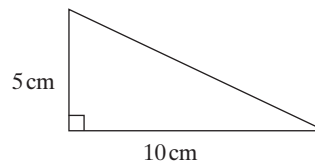
__**$25\,cm^2$**__

**26**
[Area of triangle]

6.5 mm

8 mm
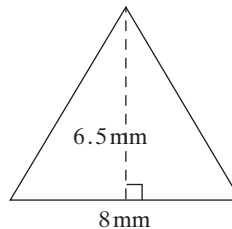
__**$26\,mm^2$**__

**27**
[Area of triangle]

11 mm

15 mm
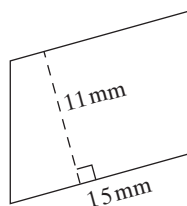
__**$165\,mm^2$**__

**28**
[Area of parallelogram] Lian wants to plant lawn in her backyard, which is 12 m long and 4 m wide. Calculate the area of lawn. (Hint: draw a diagram.)

__**$48\,m^2$**__

**29**
[Area application] Nick has made a triangular sign to support his local football team. The sign has a base of 60 cm and a height of 30 cm. Calculate the area of the sign in square centimetres.

__**$900\,cm^2$**__

**30**
[Area application] What is the area of Nick's sign in square metres?

__**$0.09\,m^2$**__

| Student comment | Guardian comment/signature | Teacher feedback |
|---|---|---|
|  |  |  |

MEASUREMENT AND GEOMETRY
Length, area and volume

# Time, temperature and mass 2

Name: ................................................................................. Due date: .........../.........../...........

For **1–2**, write the temperature.

**1**
[Temperature scale]

°C

25 °C

50°
40°
30°
20°
10°
0°
−10°
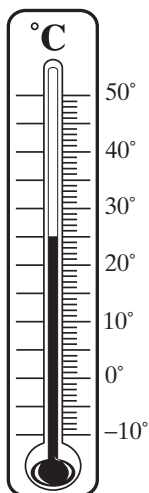
**2**
[Temperature scale]

°C

46.5 °C

50°
40°
30°
20°
10°
0°
−10°
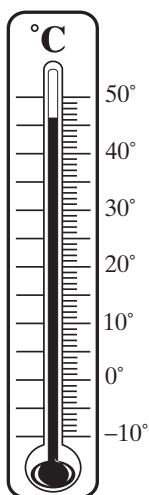
**3**
[Temperature scale]
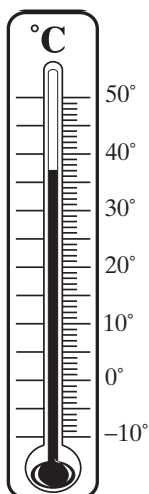
Colour the thermometer to show 37 °C.

°C

50°
40°
30°
20°
10°
0°
−10°

**4**
[Convert to Fahrenheit]

Convert 60 °C to °F.

**140 °F**

**5**
[Convert to Celsius]

Convert 50 °F to °C.

**10 °C**

**6**
[Convert to Fahrenheit]

Convert 90 °C to °F.

**194 °F**

**7**
[Convert to Celsius]

Convert the freezing point of water (0 °C) to °F.

**32 °F**

**8**
[Convert to Celsius]

Convert the boiling point of water (212 °F) to °C.

**100 °C**

**9**
[Convert to Celsius]

An American first aid book says that normal body temperature is 98.6 °F. How many degrees Celsius is that?

**37 °C**

**10**
[Convert to Celsius]

Convert 0 °F to °C.

**−18 °C**

Fiona, who lives in Australia, was talking about the weather to her friend Sam in America. The temperature at Fiona's place was 25 °C, whereas it was 59 °F at Sam's home.

**11**
[Compare temperature scales]

Convert each of the temperatures into the other scale.

**25 °C = 77 °F, 59 °F = 15 °C**

**12**
[Compare temperature scales]

Who was experiencing the warmest weather?

**Fiona**

For **13–17**, write the best unit of mass (mg, g, kg, t).

**13**
[Mass units]

A pencil

g

**14**
[Mass units]

An elephant

t

**15**
[Mass units]

A feather

mg

**16**
[Mass units]

3 litres of ice-cream

kg

**17**
[Mass units]

An MP3 player

g

**18**
[Convert mass units]

Convert 0.764 t to g.

764 000 g

**19**
[Convert mass units]

Convert 0.47 kg to mg.

470 000 kg

**20**
[Convert mass units]

Convert 5170 g to t.

0.00517 t

**21**
[Mass application]

Brody is allowed only 10 kg of luggage on the plane to Darwin. He is taking a suitcase (2 kg), clothes (4300 g), shoes (1.6 kg), a tennis racket (350 g), gifts (1.2 kg) and a book (400 g). Find the total mass. Is it within the 10 kg limit?

9.85 kg, yes

Kayla's family went on holidays. They left home at 16:30 hours and drove without stopping for 2 hours and 20 minutes. After a 15-minute break, they drove for another 2 hours and 35 minutes to get to their motel.

**22**
[Time application]

At what time did the family stop for a break?

18:50 hours or 6:50 pm

**23**
[Time application]

At what time did they arrive at their destination?

21:40 hours or 9:40 pm

**24**
[Time application]

What was the total travelling time, including the break?

5 hours and 10 minutes

At the Pooch Parlour, it took $2\frac{1}{2}$ hours to wash 5 dogs. The first dog took 28 minutes, the second had longer hair and took 45 minutes, the third took 19 minutes and the fourth 23 minutes.

**25**
[Time application]

How long did it take to wash the first four dogs?

115 minutes

**26**
[Time application]

How long did it take to wash the fifth dog?

35 minutes

At 12 noon in London, it is 10 pm (the same day) in Sydney. For **27–30**, complete the sentence.

**27**
[International time zones]

When it is 10 am in London, the time in Sydney is:

8 pm

**28**
[International time zones]

It is 9 pm on Monday in London. In Sydney, it is:

7 am on Tuesday

**29**
[International time zones]

When it is 2 pm in Sydney, the time in London is:

4 am

**30**
[International time zones]

It is 3 am on Friday in Sydney. In London, it is:

5 pm on Thursday

| Student comment | Guardian comment/signature | Teacher feedback |
|---|---|---|
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**Investigation**

# Race day

Name: ............................................................................................ Due date: ........../........../..........

At Noonee Valley Racecourse, there are 250 stalls, numbered 1 to 250. At the beginning of the day, all the stalls are occupied and their gates are closed. Every horse has its own trainer. The first trainer to arrive that morning opens all the gates. The second trainer closes every gate whose number is a multiple of 2. The third trainer changes the state of every gate whose number is a multiple of 3. (That is, the trainer closes open gates and opens closed gates.) The fourth trainer changes the state of every gate whose number is a multiple of 4, and so on. After all the trainers have arrived at the racecourse, which stall gates will be open? To find out, answer the following questions.

**1**
[Consider a simpler problem]
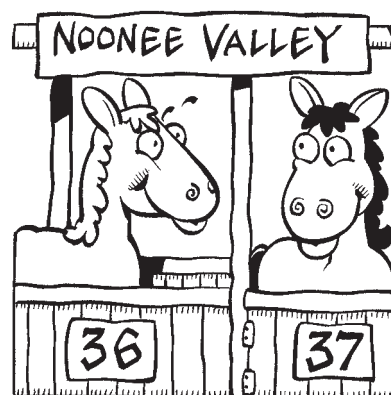
Consider the first 20 stalls only. After the second trainer closes every gate whose number is a multiple of 2, which gates will still be open?

**1, 3, 5, 7, 9, 11, 13, 15, 17, 19**

**2**
[Consider a simpler problem]

After the second trainer has finished closing stall gates, what is the state of:

**a** gate 1? _____Open_____

**b** gate 2? _____Closed_____

**3**
[Consider a simpler problem]

**a** Will any other trainer visit gates 1 and 2? _____No_____

After all 250 trainers have arrived, what will be the state of:

**b** gate 1? _____Open_____

**c** gate 2? _____Closed_____

**4**
[Draw a table]
[Use technology]

Set up a table or spreadsheet to record the changing state of the first 20 stall gates as each trainer arrives at the racecourse.

|  | Gate number | | | | |
|---|---|---|---|---|---|
| Trainer | **1** | **2** | **3** | **4** | |
| **1** | | | | | |
| **2** | | | | | |
| **3** | | | | | |
| **4** | | | | | |
| | | | | | |

NUMBER AND ALGEBRA
Number theory

**5**

[Look for a pattern]

Which gate numbers in the first 20 will be open:

**a** after the first 20 trainers have arrived? _____1, 4, 9, 16_____

**b** after all 250 trainers have arrived? _____1, 4, 9, 16_____

(Hint: which trainer is the last to visit any of these gates?)  Trainer 20

**c** Notice that the gate numbers form a pattern. Describe this pattern.

The numbers are the first four square numbers, or they increase by 3, 5, 7.

**6**

[Make a conjecture]

**a** Use the pattern you found to predict the next gate number that will be open after all 250 trainers have arrived.

25

[Test a conjecture]

**b** Extend your table to test your prediction. Was it correct? _Answers_ may vary.

[Make a conjecture]

**c** Now predict all the gate numbers that will be open after all 250 trainers have arrived.

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

**7**

One way to test your prediction would be to extend your table to include all 250 gates and 250 trainers. This would be very time consuming. Another way would be to find the reason behind the pattern you have found.

**a** For each gate you listed in question **5**, write the number of times the gate was visited.

Gate 1 was visited 1 time. Gate 4 was visited 3 times. Gate 9 was visited 3 times. Gate 16 was

visited 5 times.

**b** What do your answers to part **a** have in common?

Each gate was visited an odd number of times.

**8**

[Make connections with mathematical knowledge]

**a** How does the number of visits relate to the number of factors of a particular gate number?

For each gate, the number of visits is the same as the number of factors of the gate number.

**b** Why does this mean that only gates 1, 4, 9, 16, . . . will be open when all the trainers have arrived?

All other numbers have pairs of factors, so each pair opens and closes a gate. Square

numbers have one 'repeated' factor, which gives an odd number of factors. So these

square-numbered gates are visited an odd number of times, leaving them open.

| Student comment | Guardian comment/signature | Teacher feedback |
|---|---|---|
|  |  |  |

# Variables in Excel

Name: .................................................................................. Due date: .........../.........../...........

Microsoft Excel can be used to create tables of values based on rules or formulas. This can save a lot of time when you are using a complex formula or a large number of values.

**1**

[When entering the formula, you can click on cell B2 instead of typing 'B2'. Remember that Excel uses * for multiply and / for divide.]

Set up the following table in a new spreadsheet. Remember that Excel formulas use cell references such as B2 or B3 rather than variable names such as *n* or *m*. If you have entered the formula correctly, cell B3 will show a value of 9. That is, when $n = 1, m = 9$.

|   | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | **$m = 5 + 4n$** | | | | | |
| 2 | **n** | 1 | 2 | 3 | 4 | 5 |
| 3 | **m** | =5+4*B2 | | | | |

**2** Now we will investigate what happens when we use the formula for other values of *n*.

- Select cell B3 and drag the fill handle [ ] across to F3.

- Check that the new values of *m* are correct.

- To change between formulas and values in a spreadsheet, we press CTRL+`. Do this now to display the formulas in row 3.

|   | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | **m = 5 + 4n** | | | | | |
| 2 | **n** | 1 | 2 | 3 | 4 | 5 |
| 3 | **m** | =5+4*B2 | =5+4*C2 | =5+4*D2 | =5+4*E2 | =5+4*F2 |

What pattern do you see in the formula row? Why isn't the formula the same in each cell?

*The cell references go up by 1 because each formula relates to the value in the cell above it.*

_____

**3** A tables of values can be used to convert measurements from one scale to another; for example, from feet to metres or from pounds to kilograms. You probably know that, in the United States, the Fahrenheit scale is used for temperatures. To change a temperature in degrees Celsius (°C) to degrees Fahrenheit (°F), you can use the formula $F = \dfrac{9C}{5} + 32$.

- Set up the following conversion table in a new spreadsheet.

|   | A | B |
|---|---|---|
| 1 | **Celsius (°C)** | **Fahrenheit (°F)** |
| 2 | 0 | =9*A2/5+32 |
| 3 | 1 | |

[Remember, this will not change the actual values, only how they are shown.]

- Highlight cells A2 and A3 and drag the fill handle down to extend the table to 100 °C.

- Drag the formula in B2 down to convert the temperatures to Fahrenheit. To show whole numbers, select the cells, right-click and select **Format Cells**. Select **Number** from the **Number** menu and enter '0' for number of decimal places.

Use your table to convert the following temperatures to Fahrenheit.

**a** 0 °C = __32 °F__

**b** 15 °C = __59 °F__

**c** 40 °C = __104 °F__

**d** 100 °C = __212 °F__

**5** Now use your table of values 'backwards' to convert 100 °F to Celsius.

__38 °C__

**6** Find the temperature that has the same number value in both scales. Explain the method you used.

__−40 °C = −40 °F__

__Suitable methods include extending the table and 'guess, check and improve' .__

**Try this!** Use a spreadsheet to create a weight conversion table for kilograms to pounds.
Include values from 1 to 200 kilograms and give the conversions correct to 1 decimal place.
(Hint: 1 kilogram = 2.2 pounds)

| Student comment | Guardian comment/signature | Teacher feedback |
|---|---|---|
|  |  |  |