Macmillan

Australian Curriculum

ACTIVE MATHS 8

Australian Curriculum edition

TEACHER BOOK

Monique Miotto
Lee Blake
Ingrid Kemp
Tracey MacBeth-Dunn
Jessica Murphy
Jim Spithill

Data 1

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

For **1–5**: The hours per week spent exercising by a group of people is shown in the table below to the nearest whole hour.

Time	Tally	Frequency
0–2	𝍸 |||	8
3–5	𝍸 𝍸 |||	13
6–8	𝍸	5
9+	||	2

1 [Frequency table] Fill the missing values. in the table.

2 [Frequency table] How many people exercised for up to 2 hours a week?

8 people

3 [Modal interval] What was the most common length of time spent exercising?

3–5 hours

4 [Frequency table] How many people were surveyed?

28 people

5 [Frequency table] How many people exercised for 6 hours or more?

7 people

For **6–10**: The number of people travelling in cars along a main street was observed and recorded in the table below.

People	Tally	Frequency
1	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	30
2	𝍸 𝍸 ||||	14
3	𝍸 𝍸 𝍸 𝍸	20
4	||||	4
5	𝍸 𝍸 ||	12

6 [Frequency table] Fill in the missing values in the table.

7 [Frequency table] How many cars were observed in total?

80 cars

8 [Mode] What was the most common number of people in a car?

1 person

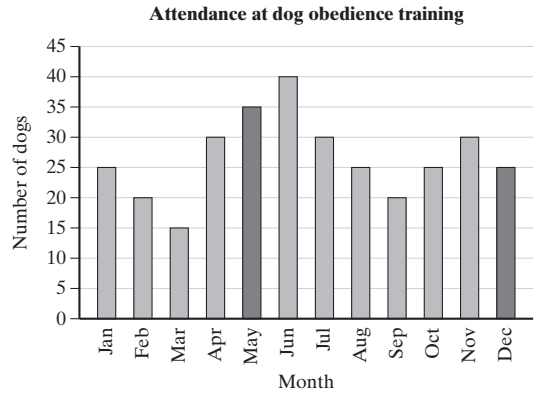
9 [Frequency table] How many cars had 2 or 3 people in the vehicle?

34 cars

10 [Frequency table] How many people in total were observed travelling in cars?

194 people

For **11–16**: A dog obedience training school recorded the number of dogs that attended training each month.



11 [Column graph] In May there were 35 dogs and in December there were 25 dogs. Add new columns to represent this data.

12 [Column graph] How many dogs attended in February?

20

13 [Column graph] In which month did the least number of dogs attend?

March

14 [Range] What was the range of dog numbers attending training during the year?

25

15 [Column graph] What does the vertical axis represent?

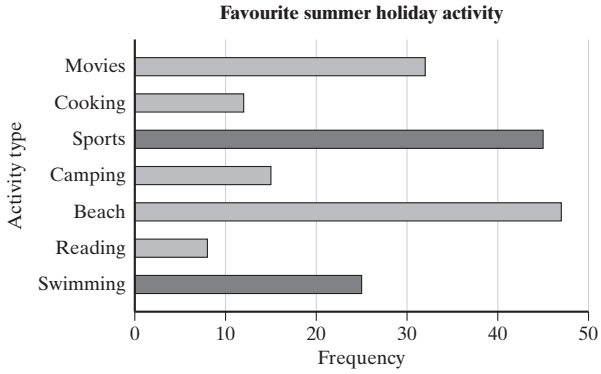
Number of dogs

16 [Column graph] What was the most common number of dogs at training?

25

ISBN: 978 1 4202 2924 0

For **17–20**: A group of people was surveyed for their favourite summer holiday activity.



17 [Bar graph] Add bars to show that 45 people preferred playing sports and 25 preferred swimming.

18 [Bar graph] Which axis is labelled with the activity types?

Vertical axis

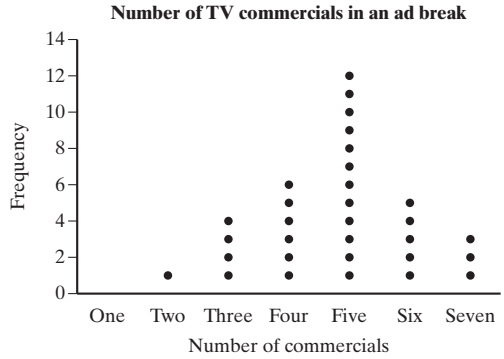
19 [Bar graph] What was the most popular activity?

Beach activity

20 [Bar graph] What is the increment between markings on the horizontal axis?

10 people

For **21–25**: The dot plot represents the number of TV commercials recorded during ad breaks.



21 [Dot plot] Add a column of dots to show that there were four commercials on six occasions, and six commercials on five occasions.

22 [Dot plot] What was the most common number of commercials during an ad break?

Five

23 [Dot plot] What was the least number of commercials during an ad break?

Two

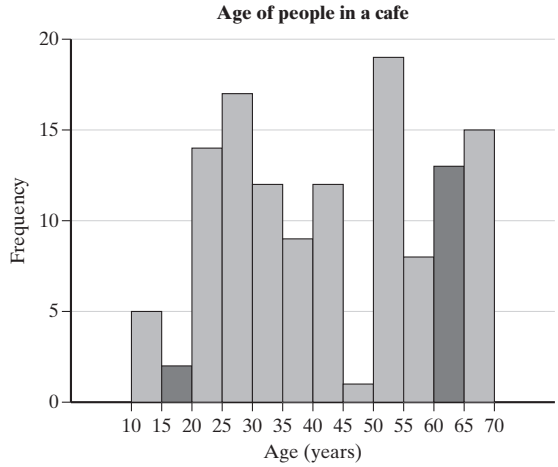
24 [Dot plot] What information is represented on the horizontal axis?

Number of commercials

25 [Dot plot] On how many occasions was there one commercial?

None

For **26–30**: The histogram represents the ages of people in a cafe.



26 [Histogram] Construct columns to show there were two people aged 15–19 and thirteen people aged 60–64 in the cafe.

27 [Histogram] Does the first column include people aged fifteen?

No

28 [Histogram] How many people were over 25 and under 30?

17 people

29 [Histogram] How many people were in the cafe?

127

30 [Histogram] True or false: Most of the people in the cafe were aged forty and over?

True

Student comment	Guardian comment/signature	Teacher feedback

ISBN: 978 1 4202 2924 0

Indices 1

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

1 [Index notation] In index notation the '2' in 2^3 is called the **base**.

2 [Index form] Write the following in index form.
$7 \times 7 \times 7 =$ 7^3

3 [Expanded form] Write the following in expanded form.
$4^5 =$ $4 \times 4 \times 4 \times 4 \times 4$

4 [Index form] Write the following in index form.
$3 \times 3 \times 3 \times 6 \times 6 \times 6 \times 6 =$ $3^3 \times 6^4$

5 [Index form] Write eight-squared in index form.
8^2

6 [Index form] Write seven to the power of four in index form.
7^4

7 [Evaluate index form] Circle the correct answer: $8^2 =$
(64) 10 6

8 [Evaluate index form] Circle the correct answer: $5^2 =$
31 (25) 10

9 [Evaluate index form] Circle the correct answer: $7^3 =$
(343) 21 10

10 [Evaluate index form] Circle the correct answer: $3^8 =$
24 (6561) 912

For **11**–**18**, use the appropriate index law to simplify.

11 [Index law: multiplication] $2^4 \times 2^5$
2^9

12 [Index law: multiplication] $10^4 \times 10^9$
10^{13}

13 [Index law: division] $7^8 \div 7^3$
7^5

14 [Index law: division] $\frac{6^7}{6^3}$
6^4

15 [Index law: zero power] 5^0
1

ISBN: 978 1 4202 2924 0

16 [Index law: brackets] $(2^4)^3$

2^{12}

17 [Index law: brackets] $(9^5)^6$

9^{30}

18 [Index law: power of one] 7^1

7

19 [Index law: multiplication] Insert the value that makes the following statement true:

$5^{\underline{3}} \times 5^2 = 5^5$

20 [Evaluate index form] Use your calculator to evaluate 5^5.

3125

21 [Index law: division] Insert the value that makes the following statement true:

$9^{12} \div 9^{\underline{7}} = 9^5$

22 [Evaluate index form] Use your calculator to evaluate 9^5

59 049

23 [Index form] Insert the value that makes the following statement true:

$(7^2)^{\underline{2}} = 7^4$

24 [Evaluate index form] Use your calculator to evaluate 7^4

2401

25 [Index law: zero power] Insert the value that makes the following statement true:

$7^{\underline{0}} = 1$

26 [Index form] Insert the missing value in the statement

$8 = \underline{2}^3$

27 [Index law: division] Simplify: $\frac{4^7}{4^3} \times \frac{5^9}{5^4}$

$4^4 \times 5^5$

28 [Index law: mixed] Simplify: $\frac{3^9}{3^2} \times 3^7$

3^{14}

29 [Index law: mixed] Simplify: $8^0 \times 5^1$

$1 \times 5 = 5$

30 [Index law: mixed] Simplify: $(2^4)^3 \times (2^5)^2$

2^{22}

Student comment	Guardian comment/signature	Teacher feedback

ISBN: 978 1 4202 2924 0

Investigation

Staircase challenge

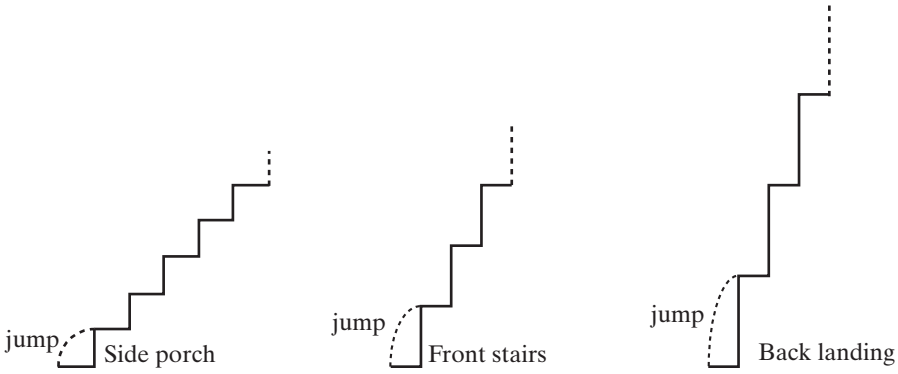
Name: ..... Due date: ...../...../.....

Freddy Frog is in training for the Reptile Olympics. His special event is the staircase challenge. Luckily, Freddy is a green frog from country Queensland so he gets plenty of practice climbing stairs to sit on shady verandahs.

1 [Connect with experience]

[Interpret a problem]

Below are partial side views of three of his training staircases. All steps are 1 lily pad deep. The first step is at ground level.



a Freddy starts with a gentle warm-up. Which staircase should he use? Why?

Freddy should start on the side porch stairs as these are the least steep.

b List the staircases in order of difficulty from easiest to hardest.

Side porch—front stairs—back landing.

2 [Draw a graph]

In the staircase challenge, the staircases are rated using the formula: $\text{Rating} = \frac{\text{Height (lily pads)}}{\text{Depth (lily pads)}}$.

The side porch has a rating of 1. The height of each step is equal to its depth.

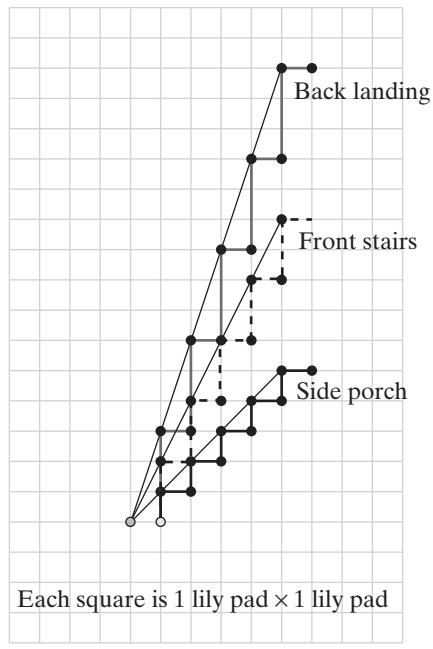
a The front stairs have a rating of 2. What does this mean?

The height of each step is twice its depth.

b The back landing has a rating of 3. What does this mean?

The height of each step is three times its depth.

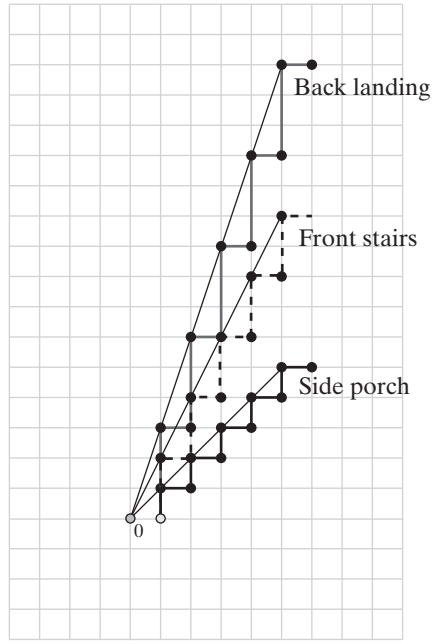
c Use the rating information to draw the side view of the first five steps of each staircase on the grid to the right, starting at the point marked ◦. The side porch has been drawn for you. Remember all steps are 1 lily pad deep.



ISBN: 978 1 4202 2924 0

3 [Draw a graph]

Freddy wants to concentrate his efforts on climbing and uses a wooden plank to slide down each staircase when he is finished. Draw the planks on your diagram in **2c**.



4 [Look for a pattern]

[Find a rate]

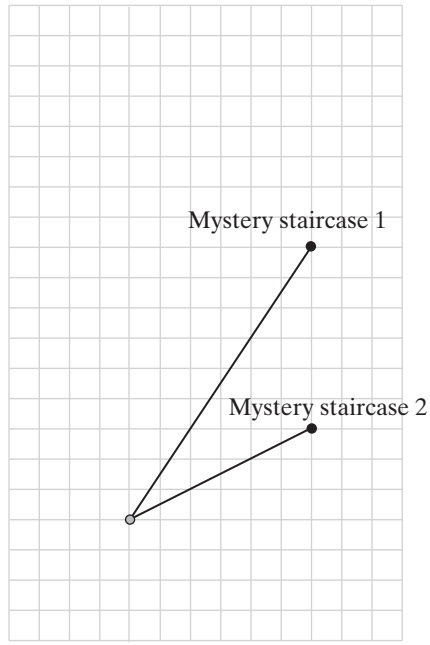
The diagram on the right shows the planks for two mystery staircases.

a What is the rating of mystery staircase 1? What does this rating mean?

1.5 or $1\frac{1}{2}$. The height of each step is one-and-a-half times its depth.

b What is the rating of mystery staircase 2? What does this rating mean?

0.5 or $\frac{1}{2}$. The height of each step is one-half its depth.



5 Complete this sentence: The higher the rating, the **steeper** the staircase.

6 [Make comparisons]

a Is mystery staircase 1 steeper than the side porch staircase? Compare their ratings.

Yes. Mystery staircase 1 has a rating 1.5, while the side porch has a rating of 1.

b Is mystery staircase 2 steeper than the front stairs? Compare their ratings.

No. Mystery staircase 1 has a rating of 1.5, while the front stairs have a rating of 1.

Student comment	Guardian comment/signature	Teacher feedback

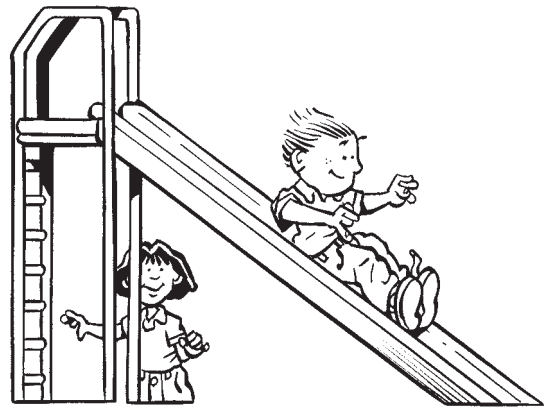
ISBN: 978 1 4202 2924 0

Technology task—The Geometer's Sketchpad

Slippery slides

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

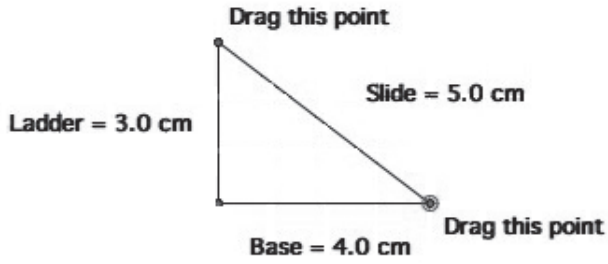
In this task you are designer of slippery slides for a new children's park. To experiment with different designs you will create an animated scale drawing in The Geometer's Sketchpad.



1
[Make sure that you un-select a measurement before selecting a new segment to measure.]

To create a drawing of a slide:

- Open a new file on the **Graph** tab and click-on the **Grid form** and **Square grid**. You should see a set of axes and a grid.
- Open the **Edit** tab and under **Preferences** make sure **Distance Units** are set to 'cm' and **Precision** to 'tenths'.
- Use the **Straight-edge** tool to create a line segment joining the origin to the point $(0, 3)$ on the y-axis and another line segment joining the origin to the point $(4, 0)$ on the x-axis. Now draw a line segment joining the points $(0, 3)$ and $(4, 0)$. You now have the basic side view of a slippery slide, although it is a little difficult to see.
- Now select the axes and the unit point (being careful not to select the line segments) and open the **Display** tab and click-on **Hide Objects** on the **Graph** tab click **Hide grid**.
- Label the points at either end of the hypotenuse 'Drag this point' by right-clicking each point and clicking on **Label Point**. Label the base 'Base', the vertical side 'Ladder', and the hypotenuse 'Slide'.
- Now measure each line segment by selecting it, opening the **Measure** tab and clicking on **Length**. Double-click each label and uncheck the **Show Label** box and move the measurements to the positions shown below.



ISBN: 978 1 4202 2924 0

a What are the dimensions of the slide shown on the drawing?

Ladder = 3.0 cm Base = 4.0 cm Slide = 5.0 cm

b The drawing you have completed is a 1:100 scale drawing of an actual slide. What are the dimensions of this slide?

Ladder = 3.0 m Base = 4.0 m Slide = 5.0 m

2 **a** By dragging the vertices of your triangle complete the drawn dimensions of the following designs (to the nearest tenth of centimetre):

Base (cm)	Ladder (cm)	Slide (cm)
6.0	8.0	10.0
5.0	12.0	13.0
8.0	15.0	17.0

b Would any of these ladder designs be appropriate for a children's playground? Why/why not?

Varied. None of these slide designs would be appropriate for a children's playground. Although they would all fit into a reasonable space based on their base length, children would need to climb 8–15 m to get to the top of the slide and then make a very steep descent.

c Drag the vertices of the triangle to create a design that you think would be appropriate for a children's slide when built. (Remember the scale is 1:100). What are the dimensions of your slide? Why would it be appropriate for a children's park?

Reasonable designs would have ladders lengths in the range of 0.5 m to 3.0 m.

3 Testing Pythagoras' theorem:

[You can edit the formula by right-clicking the answer on the screen.]

- Select the Slide Measurement and open the **Edit** tab and under **Action button**s click on **Hide/show**. Press the button to hide the slide measurement. Right-click on the button label and click on **Label Action button**. Change the label to '**Show slide length**'.
- To calculate the slide length using Pythagoras' theorem, open the **Measure** tab and click on **Calculate**. Under functions select **sqrt** and complete the brackets to read 'sqrt(Ladder^ 2 + Base^ 2)'. (Instead of typing 'Ladder' and 'Base' you can select the measurements on screen.

a Now complete the table of slide lengths using Pythagoras' theorem.

Base (cm)	Ladder (cm)	Slide (cm)
1.1	3.5	3.7
1.4	3.1	3.4
2.2	3.1	3.8

b How do your calculated values compare with the measured values on the screen?

You find that the measured and calculated values agree to the nearest tenth of a centimetre.

Try this!

Use your animated triangle to design three slides that you think would be appropriate for a super-slide park for teenagers. Give the actual dimensions of each slide, ladder and base to the nearest tenth of a metre. Give each slide an appropriate name.

Varied, e.g. the Beginner, base of 2.9 m, ladder height of 2.2 m and slide length of 3.6 m.

Student comment	Guardian comment/signature	Teacher feedback

ISBN: 978 1 4202 2924 0