

**BUILD YOUR SKILLS**

11. Leslie works for a shipping company. He regularly carries boxes up and down several stairs and has decided that it would be easier if he built a ramp. The stairs have a rise of 3.5 m for a run of 6.0 m. What is the slope of the stairs?
12. Harry is building a staircase with a slope of 0.89. If the total rise of the staircase is 203 cm, what is the total run of the stairway?
13. The slope of a slide for a playground is to be  $\frac{17}{10}$ . If the maximum space available for the slide is a horizontal distance of 1.5 m, how high will the slide be?



Builders need to consider the slope when building a new staircase.

**PRACTISE YOUR NEW SKILLS**

1. Calculate the slope as a fraction in the simplest form and as a decimal.

<i>Rise</i>	<i>Run</i>	<i>Slope</i>	
		<i>As a fraction</i> $\left(m = \frac{\text{rise}}{\text{run}}\right)$	<i>As a decimal</i>
18 m	63 m		
21 m	49 m		
1.2 cm	0.6 cm		
12.4 mm	4.6 mm		
300 ft	900 ft		

2. Use the information given to complete the table.

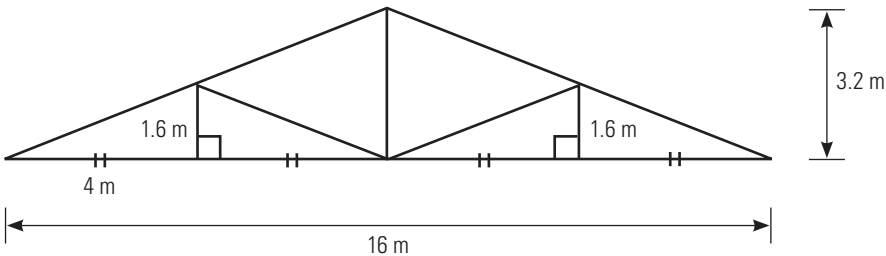
<i>Rise</i>	<i>Run</i>	<i>Slope</i>
15 ft		$\frac{1}{4}$
12 cm		0.375
	16 m	$\frac{9}{5}$
	42 in	$\frac{32}{7}$
63 m		3.0
19.5 ft		0.25

3. Zane is designing a small waterslide for children to play on. If the slide has a run of 120 inches and a height of 56 inches, what is the slope of the slide?
4. A safe slope for a ladder is 1 ft of run for every 4 ft of rise. Vincent needs to use a ladder to reach a window sill that is 22 ft above the ground. How far from the house should the base of the ladder be?
5. Harj is digging a drainage ditch. It must drop 3 cm for every 1.5 m of horizontal distance. How much will it drop in a horizontal distance of 25 m?

6. The slope of a hill is an average of 0.64. How many metres will it rise for a horizontal distance of 32 metres?

7. Hazuki needs to calculate the slope of the water table—the elevation at which water is found under the ground. One well has water at 752 m elevation and the another has it at 895 m elevation. If the wells are 1.2 km apart, what is the slope of the water table?

8. Calculate the slope of the roof and of the diagonal trusses.



9. Alfred wants to make a doll house that is a copy of his own house. The roof of his house is 10.8 m wide and is 2.4 m higher at the centre than the edges. If the doll house is 1.6 m wide, what will be the rise of the roof?

# Answer Key

## CHAPTER 1 SLOPE AND RATE OF CHANGE 1.1 RISE OVER RUN

### BUILD YOUR SKILLS, P. 11

- 1:3
- $\frac{23}{17}$
- a) 6:1                      b) 8:3  
c) 8:13
- 5.3 L
- 18 cm
- 9 cups
- a)  $\frac{1}{6}$                       b)  $\frac{1}{4}$   
c)  $\frac{4}{9}$                       d)  $\frac{5}{4}$   
e)  $\frac{24}{35}$
- 25 333 m
- 221 cm
- 15.1 m
- $\frac{7}{12}$
- 228 cm
- 2.55 m

### PRACTISE YOUR NEW SKILLS P. 17

1.

Rise	Run	Slope	
		As a fraction $\left(m = \frac{\text{rise}}{\text{run}}\right)$	As a decimal
18 m	63 m	$m = \frac{2}{7}$	0.29
21 m	49 m	$m = \frac{3}{7}$	0.43
1.2 cm	0.6 cm	$m = 2$	2
12.4 mm	4.6 mm	$m = \frac{62}{23}$	2.70
300 ft	900 ft	$m = \frac{1}{3}$	0.33

2.

Rise	Run	Slope
15 ft	60 ft	$\frac{1}{4}$
12 cm	32 cm	0.375
28.8 m	16 m	$\frac{9}{5}$
192 in	42 in	$\frac{32}{7}$
63 m	21 m	3.0
19.5 ft	78 ft	0.25

- 0.47
- 5.5 ft
- 50 cm
- 20.5 m
- $\frac{143}{1200}$  or 0.12

8.  $\frac{2}{5}$  or 0.4

9. 0.36 m

## 1.2 GRADE, ANGLE OF ELEVATION, AND DISTANCE

### BUILD YOUR SKILLS, P. 22

1. a)  $G \approx 23.8^\circ$ ,  $h \approx 4.7$  cm

b)  $S \approx 46.4^\circ$ ,  $r \approx 11.3$  m

c)  $E \approx 55.3^\circ$ ,  $f \approx 11.4$  in

2. a)  $\theta \approx 24^\circ$ ;  $m = \frac{11}{25}$  or 0.44

b)  $\theta \approx 64^\circ$ ;  $m = \frac{29}{14}$  or 2.07

3. a) 7.6 ft                      b)  $23.2^\circ$

4. a) 6.2 m                      b)  $20.8^\circ$

5. a) 28.8 m                      b) 28.9 m

6. 18%

7. a)  $-\frac{1}{48}$  or  $-0.02$       b) 2.1%

8. a)  $\frac{27}{200}$  or 0.135      b)  $7.7^\circ$

c) 2.03 m

9. 1.9 m

10. 4:3

11. 1.4 ft

### PRACTISE YOUR NEW SKILLS, P. 32

1. a)  $A \approx 50.4^\circ$ ;  $B \approx 39.6^\circ$ ;

$m = \frac{29}{35}$  or 0.83

b)  $A \approx 33.7^\circ$ ;  $B \approx 56.3^\circ$ ;

$m = \frac{3}{2}$  or 1.5

c)  $A \approx 53.8^\circ$ ;  $B \approx 36.2^\circ$ ;

$m = \frac{19}{26}$  or 0.73

d)  $A \approx 54.0^\circ$ ;  $B \approx 36.0^\circ$ ;

$m = \frac{8}{11}$  or 0.73

2. a) 7.3 m                      b)  $9.5^\circ$

3. a) For  $35^\circ$ ,  $m \approx 0.7$ ; for  $45^\circ$ ,  $m = 1.0$

b) 70% and 100%

4. a)  $m = \frac{3}{500}$  or 0.006

b) 7.2 cm

c)  $0.34^\circ$

5. a) 2987 m                      b) 9.2%

6. a) 2:5                          b) 0.4

c) 40%

7. The roof of the second house is steeper.

8. 4.8%

## 1.3 RATE OF CHANGE

### BUILD YOUR SKILLS, P. 39

1. slope  $\ell_1 = \frac{3}{5}$ ; slope  $\ell_2 = \frac{3}{2}$ ; line  $\ell_2$  is steeper.

2. slope  $\ell_1 = 0$ ; slope  $\ell_2$  is undefined.