Measurement – units of measurement
Student Book – Series L

Contents

Author of The Topics and Topic Tests: AS Kalra

Measurement – units of measurement

Topic 1 - Units of measurement

QUESTION **1** Which of the units kilometre, metre or millimetre would be the most appropriate to measure the:

a height of a tree _____

b length of a river _____

c width of a piece of paper _____

d length of a bus _____

QUESTION **2** Which of the units gram, kilogram or tonne would be most appropriate to measure the:

a weight of a pencil _____

b load on a semi-trailer _____

c mass of a packet of biscuits _____

d weight of a bus _____

QUESTION **3** Choose the most appropriate unit from millilitre, litre or megalitre, to measure:

a a dose of medicine _____

b the capacity of a cup _____

c the amount of water in a dam _____

d the capacity of a hot-water service _____

QUESTION **4** Which of the units cm^2, m^2 or hectare would be the most appropriate to measure the area of:

a a postage stamp _____

b a farm _____

c the floor of a room _____

d a sheet of newspaper _____

QUESTION **5** Choose the most appropriate unit from cm^3 or m^3 to measure the volume of:

a a tissue box _____

b a water tank _____

c a shed _____

d a cake tin _____

QUESTION **6** Choose the appropriate unit for each of the following.

a The weight of a person. _____

b The height of an elephant. _____

c The distance between two towns. _____

d The amount of petrol in a car's petrol tank. _____

e The length of a pen. _____

Measurement – units of measurement

Topic 2 - Conversions between units

QUESTION **1** Complete each of the following.

a 50 mm = _____ cm	**b** 900 cm = _____ m	**c** 6000 m = _____ km
d 23 cm = _____ mm	**e** 24 m = _____ cm	**f** 8 km = _____ m
g 93 mm = _____ cm	**h** 3 m = _____ mm	**i** 3600 m = _____ km
j 3.8 cm = _____ mm	**k** 8.2 m = _____ cm	**l** 8.3 m = _____ cm
m 65 cm = _____ mm	**n** 198 mm = _____ cm	**o** 967 cm = _____ m

QUESTION **2** Complete each of the following.

a 4000 g = _____ kg	**b** 5000 kg = _____ t	**c** 6783 g = _____ kg
d 9369 g = _____ kg	**e** 9300 kg = _____ t	**f** 9 kg = _____ g
g 38.5 kg = _____ g	**h** 6.38 t = _____ kg	**i** 9.36 t = _____ kg
j 55.76 kg = _____ g	**k** 8 t = _____ kg	**l** 4639 g = _____ kg
m 6 t = _____ kg	**n** 3657 g = _____ kg	**o** 98.7 kg = _____ g

QUESTION **3** Complete each of the following.

a 3000 mL = _____ L	**b** 35 000 L = _____ kL	**c** 9683 mL = _____ L
d 4500 mL = _____ L	**e** 5900 L = _____ kL	**f** 8939 L = _____ kL
g 12 000 L = _____ kL	**h** 36.8 L = _____ mL	**i** 23.8 L = _____ mL
j 16 L = _____ mL	**k** 9 kL = _____ L	**l** 85.653 L = _____ mL
m 8.6 kL = _____ L	**n** 19.3 kL = _____ L	**o** 1936 mL = _____ L

QUESTION **4** Complete:

a 0.2 m = _____ cm	**b** 0.6 L = _____ mL	**c** 0.3 kg = _____ g
d 0.007 m = _____ mm	**e** 0.8 t = _____ kg	**f** 0.05 km = _____ m
g 0.004 kL = _____ L	**h** 0.1 cm = _____ mm	**i** 0.07 m = _____ cm
j 2 mm = _____ cm	**k** 2 mm = _____ m	**l** 40 g = _____ kg
m 900 L = _____ kL	**n** 50 cm = _____ m	**o** 6 kg = _____ t

QUESTION **5** Complete:

a 1 megalitre = _____ litres

b 1 hectare = _____ m^2

c 1 kilometre = _____ cm

d 1 tonne = _____ g

Measurement – units of measurement

Topic 3 - Relative error

QUESTION **1** Each of the following measurements are given to the nearest centimetre. Write the limits between which the true lengths lie.

a 8 cm _____ **b** 11 cm _____

c 56 cm _____ **d** 75 cm _____

e 83 m _____ **f** 61 m _____

g 92 cm _____ **h** 68 cm _____

QUESTION **2** Each of the following measurements are given to the nearest 10 metres. Write the limits between which the true lengths lie.

a 70 m _____ **b** 830 m _____

c 300 m _____ **d** 1500 m _____

e 3 km _____ **f** 12 km _____

g 360 m _____ **h** 580 m _____

QUESTION **3** Each of the following measurements are given correct to 1 decimal place. Write the limits between which the true lengths lie.

a 5.6 m _____ **b** 8.3 km _____

c 0.3 m _____ **d** 8.9 km _____

e 2.5 m _____ **f** 13.6 m _____

g 18.2 m _____ **h** 7.7 m _____

QUESTION **4** A block of land requires a fence which is 50 m long and 30 m wide when measured to the nearest metre.

a Between which two measurements does the length lie?

_____

b Between which two measurements does the width lie?

_____

c Find the smallest possible area.

_____

d Find the largest possible area.

_____

Measurement – units of measurement

Topic 4 - Percentage error

QUESTION **1** Find the percentage error for a measurement of:

a 50 cm ± 5 cm

b 75 m ± 0.5 m

c 15 g ± 0.5 g

d 12.5 L ± 0.05 L

e 16.32 m ± 0.005 m

f 48.24 km ± 5 m

QUESTION **2** Find the percentage error if each measurement is written correct to the nearest unit.

a 25 m

b 40 mm

c 62 kg

d 37 mL

e 148 km

f 87 t

QUESTION **3** Find the percentage error if each measurement is given correct to one decimal place.

a 28.4 m

b 12.7 kg

c 2.1 L

QUESTION **4** Find the percentage error if each measurement is given correct to two decimal places.

a 8.88 kg

b 16.24 km

c 4.35 t

Measurement – units of measurement

Topic 5 - Recognizing and reducing error

QUESTION **1** List three possible sources of error in measuring.

QUESTION **2** Find the average of these measurements.

a 2.75 m, 2.85 m

b 456 mL, 462 mL

c 381 kg, 373 kg, 374 kg

d 815.3 L, 816.1 L, 815.7 L

e 6.1 m^2, 5.8 m^2

f 973 g, 971 g, 974 g, 977 g

QUESTION **3** Gary measured the length of a piece of timber and found it to be 2.7 m long. He didn't feel confident that this was the correct length of the timber. What do you suggest Gary should do?

QUESTION **4** Heather measured the length of a room twice. The first time she found it to be 6.63 m long and the second time 6.57 m. What do you think Heather should record as the length of the room? Justify your answer.

Measurement – units of measurement

Topic 6 - Significant figures

QUESTION **1** Round off each number to the number of significant figures indicated.

a 38 653 to 3 significant figures

b 24 686 357 to 2 significant figures

c 387 006 432 to 1 significant figure

d 96 481 to 1 significant figure

e 3653.854 to 3 significant figures

f 857 300 to 2 significant figures

g 0.005 6831 to 2 significant figures

h 5.238 765 41 to 3 significant figures

i 0.000 035 8132 to 2 significant figures

j 76.362 to 3 significant figures

k 0.000 139 7643 to 2 significant figures

l 0.007 5436 to 1 significant figure

QUESTION **2** Write each number correct to 3 significant figures.

a 56 383 420

b 8 361 000 000

c 43 682

d 0.036 8735

e 0.555 8324

f 0.000 325 69

QUESTION **3** Leon used a tape measure, marked in centimetres, to measure a piece of material. Leon finds the material to be 1.8775 m long. Do you think this is a reasonable finding? Briefly comment.

QUESTION **4** Sean has a set of kitchen scales that measure up to 5 kg. The scales have a dial, each division of which is 20 g. To what accuracy can Sean use his scales? Briefly comment.

Measurement – units of measurement

Topic 7 - Scientific notation

QUESTION **1** Write the following numbers in scientific notation.

a 7000 = _____ b 19 000 = _____ c 53 000 = _____

d 647 000 = _____ e 816 000 000 = _____ f 5 800 000 000 = _____

g 690 = _____ h 873 = _____ i 235 000 = _____

j 56 000 = _____ k 64 900 = _____ l 865 000 000 = _____

QUESTION **2** Write the following in scientific notation.

a 0.035 = _____ b 0.0038 = _____ c 0.06532 = _____

d 0.000 058 = _____ e 0.000 0043 = _____ f 0.00075 = _____

g 0.00059 = _____ h 0.0067 = _____ i 0.000 094 = _____

j 0.0356 = _____ k 0.0098 = _____ l 0.05361 = _____

QUESTION **3** Express the following as ordinary numerals.

a 4×10^3 = _____ b 3.6×10^4 = _____ c 7.29×10^7 = _____

d 3.5×10^5 = _____ e 4.75×10^3 = _____ f 7.96×10^5 = _____

g 7.4×10^4 = _____ h 2.5×10^6 = _____ i 5.13×10^3 = _____

j 9.5×10^3 = _____ k 5.83×10^2 = _____ l 6.91×10^5 = _____

QUESTION **4** Express the following as decimal numerals.

a 4.8×10^{-2} = _____ b 3.05×10^{-4} = _____ c 7.15×10^{-5} = _____

d 5.4×10^{-3} = _____ e 3.9×10^{-2} = _____ f 5.12×10^{-3} = _____

g 6.7×10^{-6} = _____ h 5.5×10^{-5} = _____ i 8×10^{-4} = _____

j 7.69×10^{-5} = _____ k 1.6×10^{-3} = _____ l 5.3×10^{-6} = _____

QUESTION **5** Calculate the following, expressing answers in scientific notation correct to 2 decimal places.

a $(2.5 \times 10^3) \times (1.5 \times 10^2)$ = _____ b $(5.4 \times 10^3) \times (4.8 \times 10^2)$ = _____

c $(5.1 \times 10^3) \times (2.3 \times 10^3)$ = _____ d $(8.1 \times 10^4) \div (2.7 \times 10^2)$ = _____

e $(6.4 \times 10^5) \div (1.6 \times 10^3)$ = _____ f $(8.5 \times 10^4) - (7.6 \times 10^2)$ = _____

g $(3.8 \times 10^3) \times (2.1 \times 10^4)$ = _____ h $(7.6 \times 10^3)^2$ = _____

QUESTION **6** Evaluate to 1 decimal place, leaving your answer in scientific notation.

a $\dfrac{6.835 \times 10^9}{57.6}$ = _____ b $\dfrac{(30 \times 70)^2}{3.16 \times 10^{-2}}$ = _____ c $\dfrac{5.68 \times 10^4}{2.13 \times 10^{-2}}$ = _____

d $\sqrt{\dfrac{5.96 \times 10^4}{3.2 \times 10^2}}$ = _____ e 8^{-9} = _____ f $0.0025 \div 625.7$ = _____

Measurement – units of measurement

Topic 8 - Rates

QUESTION **1**

a 320 km in 5 hours is a rate of _____ per hour.

b 48 books bought for $360 is at a rate of _____ per book.

c If 900 litres of water flows through a tap in 2 hours it is a rate of _____ per minute.

d Richard works for 10 hours and is paid $248. His rate of pay is _____ per hour.

e 5 kg of peas cost $12.50, which equals _____ per kg.

QUESTION **2** Find the given rates.

a Michael drives 180 km in 3 hours. Find his average speed.

b John delivers 840 bottles of milk every day between 6 a.m. and 10 a.m. Find his hourly rate of delivery.

c A tree grows 32.4 metres over a period of $8\frac{1}{2}$ years. What is the average annual growth rate is metres per year?

d Eva earns $850 for a 40 hour week. Find her hourly rate of pay.

e A car travels 600 km on a journey and covers this distance in 6 hours 15 minutes. Calculate the car's average speed in kilometres per hour.

QUESTION **3** 198 litres of water flows through a filter in $5^1/_2$ minutes.

a What is the volume flow rate in litres per minute?

b At this rate how many litres will flow through the filter in 1 hour?

c How long will it take for 540 litres to flow through the filter?

Measurement – units of measurement

Topic 9 - Conversion of rates

QUESTION **1** Complete these equivalent rates.

a 90 km/h = _____ km/min b 10 L/h = _____ L/day c 8 m/min = _____ m/h

d $3/min = _____ $/h e 20 mL/min = _____ mL/h f 30°/min = _____ °/s

QUESTION **2** A speed of 54 kilometres per hour is how many:

a metres per hour _____

b metres per minute _____

c metres per second _____

QUESTION **3** A speed of 23 metres per second is how many:

a metres per minute _____

b metres per hour _____

c kilometres per hour _____

QUESTION **4** A flow rate of 5 millilitres per second is how many:

a millilitres per minute _____

b millilitres per hour _____

c litres per hour _____

QUESTION **5** A car is travelling at 90 km/h. How many metres does it travel in one second?

_____

_____

_____

_____

QUESTION **6** Change:

a 78 km/h to m/s

_____

_____

_____

_____

b 10 m/s to km/h

_____

_____

_____

_____

QUESTION **7** Sand is flowing from a truck at the rate of 300 kg per second. At this rate how many tonnes would flow in an hour?

_____

_____

_____

_____

_____

_____

_____

Measurement – units of measurement

Topic 10 - Concentrations

QUESTION **1** A brand of antiseptic recommends that it should be diluted at the rate of 1 mL of antiseptic for every 20 mL of water. How many millilitres of antiseptic should be used in 600 mL of water?

QUESTION **2** A hospital patient needs to receive 2 litres of a medication per day. He receives the medication intravenously by means of a drip. 18 drops make up one mL.

a How many drops must the patient receive in a day?

b At what rate, in drops per minute, must the drip flow?

QUESTION **3** Cows are fed 2 kg of grain each per day. They need to receive 30 g of a supplement each per day and the easiest way to do this is to mix the supplement with the grain. How many kg of the supplement should be added to a tonne of grain?

QUESTION **4** A type of weedkiller recommends it be mixed with water at the rate of 500 mL of weedkiller per 100 L of water.

a How much weedkiller would need to be added to a spray unit which contains 750 litres of water?

b It is recommended that the spray mixture be applied to paddocks at the rate of 120 L per hectare. How many litres of spray mixture will be needed to spray an area of 25 hectares?

c How much weedkiller is needed to spray 25 hectares?

d If the capacity of the spray unit is 800 L, how many times must it be filled to spray 25 hectares?

Measurement – units of measurement

Topic 11 - Percentage changes

QUESTION **1** All items in a shop are on sale at 15% discount off the marked price.

a Find the sale price of a shirt marked $48.

b A shop assistant receives a staff discount of 10%. Find the price the shop assistant must pay for the shirt if the staff discount is taken off the already discounted price.

c What is the total percentage discount the shop assistant has received?

QUESTION **2** An amount of $760 is decreased by 30% and the resulting amount is then increased by 20%.

a What is the final amount?

b What is the overall percentage change in the amount?

QUESTION **3** An amount of $420 is subjected to an increase of 20% followed by a decrease of 20%. Find the overall change in the amount.

QUESTION **4** Billy has an insurance policy on his car. The total premium on the policy is $1080.

a Billy has a 60% no-claim bonus, meaning he receives a 60% discount on the premium. How much will Billy need to pay after the discount has been applied?

b Billy also receives a 15% discount for having multiple policies with the insurance company. This discount is applied after any other discounts. What actual percentage discount does Billy receive on his premium for having multiple policies?

Measurement – units of measurement

Topic 12 - Ratios

QUESTION **1** Express the following ratios in simplest form.

a 3 : 6 = _____ b 5 : 5 = _____ c 6 : 18 = _____

d 12 : 4 = _____ e 14 : 22 = _____ f 90 : 80 = _____

g 16 : 12 = _____ h 8 : 84 = _____ i 10 : 20 : 30 = _____

j $\frac{1}{2} : \frac{1}{4}$ = _____ k $2\frac{1}{2} : 2$ = _____ l 1.5 : 2 = _____

QUESTION **2** Simplify the following ratios.

a 30c : $6 b 1 h : 40 min c 6 mm : 10 cm d 3 days : 6 weeks

_____ _____ _____ _____

_____ _____ _____ _____

e 500 g : 3 kg f 6 days : 48 h g 10 h : 1 day h 13 weeks : 1 year

_____ _____ _____ _____

_____ _____ _____ _____

QUESTION **3** There are 30 cows and 18 calves in a paddock. What is the ratio, in simplest form, of cows to calves?

_____

_____

_____

QUESTION **4** Kelly counts 42 trucks and 105 cars passing through an intersection. What is the ratio of trucks to cars in simplest form?

_____

_____

_____

QUESTION **5** A rectangle has length 20 cm and breadth 12 cm. What is the ratio of its length to its perimeter?

_____

_____

_____

QUESTION **6** Find the ratio of the areas of two squares whose sides are 4 cm and 5 cm respectively.

_____

_____

_____

Measurement – units of measurement

Topic 13 - Using ratios

QUESTION **1** The ratio of boys to girls is 2 : 3. If there are 24 boys, how many girls are there?

QUESTION **2** The ratio of flour to sugar in a recipe is 3 : 2. If a recipe uses 240 g of flour, how much sugar should be used?

QUESTION **3** Divide:

a $36 in the ratio 4 : 5

b $80 in the ratio 3 : 2

QUESTION **4** Damien and Ricky share $48 000 in the ratio 5 : 3. What is Ricky's share?

QUESTION **5** The ratio of adults to children on a train trip is 4 : 1. If the train is carrying 600 passengers, find the number of adults and children on the train.

QUESTION **6** The three angles of a triangle are in the ratio 1 : 2 : 3. Find the size of each angle.

Measurement – units of measurement

Topic 14 - Unitary method

QUESTION **1** 12 cans of dog food cost $15.60. What is the price of:

a 1 can

b 23 cans?

QUESTION **2** 7 bales of silage hay weigh 4.2 t. How much would 12 bales weigh?

QUESTION **3** Find the whole amount if:

a 25% is $16

b 10% is 56 cm

c 15% is 480 L

QUESTION **4** John's income increased by 4%. If his income rose by $850, find his previous income.

QUESTION **5** I spent 48% of my allowance on a movie which cost $15.60. How much is my allowance?

QUESTION **6** 5.2 litres of fruit punch will fill 16 glasses.

a How many litres of punch are needed to fill 25 glasses?

b How many glasses can be filled if there are 13 litres of punch?

Measurement – units of measurement

Topic Test — PART A

Instructions This part consists of 12 multiple-choice questions
Each question is worth 1 mark
Calculators may be used
Fill in only ONE CIRCLE for each question

Time allowed: 30 minutes **Total marks = 25**

1 How many mL in 3.5 L?

Ⓐ 35 Ⓑ 350 Ⓒ 3500 Ⓓ 35 000

2 Change 90 km/h into km/min.

Ⓐ 1 km/min Ⓑ 1.5 km/min Ⓒ 2 km/min Ⓓ 2.5 km/min

3 The capacity of a glass would be closest to:

Ⓐ 30 mL Ⓑ 300 mL Ⓒ 3000 mL Ⓓ 3500 mL

4 10 litres per hour equals how many litres per day?

Ⓐ 210 Ⓑ 220 Ⓒ 230 Ⓓ 240

5 A car travels 441 km in $5\frac{1}{4}$ hours. Calculate the average speed.

Ⓐ 48 km/h Ⓑ 77 km/h Ⓒ 80 km/h Ⓓ 84 km/h

6 In a school of 957 students, boys and girls are in the ratio 6 : 5. How many girls are there?

Ⓐ 552 Ⓑ 87 Ⓒ 435 Ⓓ 348

7 If $24 000 is divided in the ratio 2 : 3, what is the smaller share?

Ⓐ $9600 Ⓑ $14 400 Ⓒ $10 500 Ⓓ none of these

8 Which would be the most appropriate unit to measure the amount of water in a full bucket?

Ⓐ millilitres Ⓑ litres Ⓒ kilolitres Ⓓ megalitres

9 A piece of timber is measured to be 1.65 m long to the nearest centimetre. The percentage error is closest to:

Ⓐ ± 0.3% Ⓑ ± 0.6% Ⓒ ± 6% Ⓓ ± 30%

10 An amount of money is subjected to a decrease of 20% followed by an increase of 20%. The final amount is:

Ⓐ less than the original amount Ⓑ equal to the original amount

Ⓒ greater than the original amount Ⓓ there is not enough information

Measurement – units of measurement

Topic Test

PART A

11 A petrol tank when half full holds 40 litres. How much more petrol does it hold if it is three quarters full?

Ⓐ 10 L Ⓑ 15 L Ⓒ 20 L Ⓓ 60 L

12 A speed of 20 m/s is how many km/h?

Ⓐ 56 Ⓑ 70 Ⓒ 72 Ⓓ 75

Total marks achieved for PART A ____/12

Measurement – units of measurement

Topic Test — PART B

Instructions Show all necessary working

Total marks = 13

13 Light travels at a speed of 3×10^8 m/s. How many kilometres does it travel in 1 hour? **2 marks**

14 Three business partners share their annual profit in the ratio 3 : 4 : 5. How much does each receive if the profit is $108 000? **3 marks**

15 A packet of dried fruit weighs 500 g. If this is correct to the nearest 10 g, between what measurements does the weight lie? **2 marks**

16 A piece of paper is 254 mm long, to the nearest mm. What is the percentage error? **2 marks**

17 A brand of bleach recommends that it should be diluted at the rate of $1\frac{1}{2}$ tablespoons per litre of water.

a How many tablespoons of bleach should be added to 5 litres of water? **1 mark**

b How much water should be used with 12 tablespoons of bleach? **1 mark**

c If a standard tablespoon is 20 mL, find the recommended ratio of bleach to water, in simplest form. **1 mark**

18 Change 180 km/h into m/s. **1 mark**

Total marks achieved for PART B 13

Measurement – units of measurement

Topic Test — PART A

Instructions This part consists of 12 multiple-choice questions
Each question is worth 1 mark
Calculators may be used
Fill in only ONE CIRCLE for each question

Time allowed: 30 minutes **Total marks = 25**

1 How many mL in 3.5 L?

Ⓐ 35 Ⓑ 350 Ⓒ 3500 Ⓓ 35 000

2 Change 90 km/h into km/min.

Ⓐ 1 km/min Ⓑ 1.5 km/min Ⓒ 2 km/min Ⓓ 2.5 km/min

3 The capacity of a glass would be closest to:

Ⓐ 30 mL Ⓑ 300 mL Ⓒ 3000 mL Ⓓ 3500 mL

4 10 litres per hour equals how many litres per day?

Ⓐ 210 Ⓑ 220 Ⓒ 230 Ⓓ 240

5 A car travels 441 km in $5\frac{1}{4}$ hours. Calculate the average speed.

Ⓐ 48 km/h Ⓑ 77 km/h Ⓒ 80 km/h Ⓓ 84 km/h

6 In a school of 957 students, boys and girls are in the ratio 6 : 5. How many girls are there?

Ⓐ 552 Ⓑ 87 Ⓒ 435 Ⓓ 348

7 If $24 000 is divided in the ratio 2 : 3, what is the smaller share?

Ⓐ $9600 Ⓑ $14 400 Ⓒ $10 500 Ⓓ none of these

8 Which would be the most appropriate unit to measure the amount of water in a full bucket?

Ⓐ millilitres Ⓑ litres Ⓒ kilolitres Ⓓ megalitres

9 A piece of timber is measured to be 1.65 m long to the nearest centimetre. The percentage error is closest to:

Ⓐ ± 0.3% Ⓑ ± 0.6% Ⓒ ± 6% Ⓓ ± 30%

10 An amount of money is subjected to a decrease of 20% followed by an increase of 20%. The final amount is:

Ⓐ less than the original amount Ⓑ equal to the original amount

Ⓒ greater than the original amount Ⓓ there is not enough information

Measurement – units of measurement

Topic Test — PART A

11 A petrol tank when half full holds 40 litres. How much more petrol does it hold if it is three quarters full?

Ⓐ 10 L Ⓑ 15 L Ⓒ 20 L Ⓓ 60 L

12 A speed of 20 m/s is how many km/h?

Ⓐ 56 Ⓑ 70 Ⓒ 72 Ⓓ 75

Total marks achieved for PART A ____/12

Measurement – units of measurement

Topic Test — PART B

Instructions Show all necessary working

Total marks = 13

13 Light travels at a speed of 3×10^8 m/s. How many kilometres does it travel in 1 hour? **2 marks**

14 Three business partners share their annual profit in the ratio 3 : 4 : 5. How much does each receive if the profit is $108 000? **3 marks**

15 A packet of dried fruit weighs 500 g. If this is correct to the nearest 10 g, between what measurements does the weight lie? **2 marks**

16 A piece of paper is 254 mm long, to the nearest mm. What is the percentage error? **2 marks**

17 A brand of bleach recommends that it should be diluted at the rate of $1^1/_2$ tablespoons per litre of water.

a How many tablespoons of bleach should be added to 5 litres of water? **1 mark**

b How much water should be used with 12 tablespoons of bleach? **1 mark**

c If a standard tablespoon is 20 mL, find the recommended ratio of bleach to water, in simplest form. **1 mark**

18 Change 180 km/h into m/s. **1 mark**

Total marks achieved for PART B 13

Answers – Measurement – units of measurement

Page 1 1 a Metre b Kilometre c Millimetre d Metre 2 a Gram b Tonne c Gram d Tonne 3 a Millilitre b Millilitre c Megalitre d Litre 4 a cm^2 b ha c m^2 d cm^2 5 a cm^3 b m^3 c m^3 d cm^3 6 a Kilogram b Metre c Kilometre d Litre e Centimetre or Millimetre

Page 2 1 a 5 cm b 9 m c 6 km d 230 mm e 2400 cm f 8000 m g 9.3 cm h 3000 mm i 3.6 km j 38 mm k 820 cm l 830 cm m 650 mm n 19.8 cm o 9.67 m 2 a 4 kg b 5 t c 6.783 kg d 9.369 kg e 9.3 t f 9000 g g 38 500 g h 6380 kg i 9360 t j 55 760 g k 8000 kg l 4.639 kg m 6000 kg n 3.657 kg o 98 700 g 3 a 3 L b 35 kL c 9.683 L d 4.5 L e 5.9 kL f 8.939 kL g 12 kL h 36 800 mL i 23 800 mL j 16 000 mL k 9000 L l 85 653 mL m 8600 L n 19 300 L o 1.936 L 4 a 20 cm b 600 mL c 300 g d 7 mm e 800 kg f 50 m g 4 L h 1 mm i 7 cm j 0.2 cm k 0.002 m l 0.04 kg m 0.9 kL n 0.5 m o 0.006 t 5 a 1 000 000 L b 10 000 m^2 c 100 000 cm d 1 000 000 g

Page 3 1 a 7.5 cm, 8.5 cm b 10.5 cm, 11.5 cm c 55.5 cm, 56.5 cm d 74.5 cm, 75.5 cm e 82.995 m, 83.005 m f 60.995 m, 61.005 m g 91.5 cm, 92.5 cm h 67.5 cm, 68.5 cm 2 a 65 m, 75 m b 825 m, 835 m c 295 m, 305 m d 1495 m, 1505 m e 2.995 km, 3.005 km f 11.995 km, 12.005 km g 355 m, 365 m h 575 m, 585 m 3 a 5.55 m, 5.65 m b 8.25 km, 8.35 km c 0.25 m, 0.35 m d 8.85 km, 8.95 km e 2.45 m, 2.55 m f 13.55 m, 13.65 m g 18.15 m, 18.25 m h 7.65 m, 7.75 m 4 a 49.5 m, 50.5 m b 29.5 m, 30.5 m c 1460.25 m^2 d 1540.25 m^2

Page 4 1 a ± 10% b ± 0.67% c ± 3.33% d ± 0.4% e ± 0.03% f ± 0.01% 2 a ± 2% b ± 1.25% c ± 0.81% d ± 1.35% e ± 0.34% f ± 0.57% 3 a ± 0.18% b ± 0.39% c ± 2.38% 4 a ± 0.06% b ± 0.03% c ± 0.11%

Page 5 1 The measuring instrument may be faulty, the measuring instrument may not be used correctly or the measurement may not be read correctly 2 a 2.80 m b 459 mL c 376 kg d 815.7 L e 6.0 m^2 f 974 g 3 Use a different tape-measure or ruler and re-measure the piece of timber. Gary should also estimate the length to see if the measurement is reasonable 4 Heather should record 6.60 m as the length of the room, this is the average of the two measurements.

Page 6 1 a 38 700 b 25 000 000 c 400 000 000 d 100 000 e 3650 f 860 000 g 0.0057 h 5.24 i 0.000 036 j 76.4 k 0.00 014 l 0.008 2 a 56 400 000 b 8 360 000 000 c 43 700 d 0.0369 e 0.556 f 0.000 326 3 No, with a tape measure it would be difficult to measure accurately to the nearest millimetre 4 The accuracy would be to the nearest 20 gram with a possible error of ± 10 gram

Page 7 1 a 7×10^3 b 1.9×10^4 c 5.3×10^4 d 6.47×10^5 e 8.16×10^8 f 5.8×10^9 g 6.9×10^2 h 8.73×10^2 i 2.35×10^5 j 5.6×10^4 k 6.49×10^4 l 8.65×10^8 2 a 3.5×10^{-2} b 3.8×10^{-3} c 6.532×10^{-2} d 5.8×10^{-5} e 4.3×10^{-6} f 7.5×10^{-4} g 5.9×10^{-4} h 6.7×10^{-3} i 9.4×10^{-5} j 3.56×10^{-2} k 9.8×10^{-3} l 5.361×10^{-2} 3 a 4000 b 36 000 c 72 900 000 d 350 000 e 4750 f 796 000 g 74 000 h 2 500 000 i 5130 j 9500 k 583 l 691 000 4 a 0.048 b 0.000 305 c 0.0000 715 d 0.0054 e 0.039 f 0.00 512 g 0.000 0067 h 0.000 055 i 0.0008 j 0.000 0769 k 0.0016 l 0.000 0053 5 a 3.75×10^5 b 2.59×10^6 c 1.17×10^7 d 3.00×10^2 e 4.00×10^2 f 8.42×10^4 g 7.98×10^7 h 5.78×10^7 6 a 1.2×10^8 b 1.4×10^8 c 2.7×10^6 d 1.4×10^1 e 7.5×10^{-9} f 4.0×10^{-6}

Page 8 1 a 64 km/h b $7.50/book c 7.5 L/min d $24.80/h e $2.50/kg 2 a 60 km/h b 210 bottles/h c 3.81 m/year d $21.25/hour e 96 km/h 3 a 36 L/min b 2160 L c 15 min

Page 9 1 a 1.5 km/min b 240 L/day c 480 m/h d $180/h e 1200 mL/h f 0.5°/s 2 a 54 000 m/h b 900 m/min c 15 m/s 3 a 1380 m/min b 82 800 m/h c 82.8 km/h 4 a 300 mL/min b 18 000 mL/h c 18 L/h 5 25 m 6 a 21.67 m/s b 36 km/h 7 1080 t

Page 10 1 30 mL 2 a 36 000 drops b 25 drops/min 3 15 kg 4 a 3.75 L b 3000 L c 14.93 L d 4 times.

Page 11 1 a $40.80 b $36.72 c 23.5% 2 a $638.40 b Decrease of 16% 3 Decrease of $16.80 4 a $432 b 66%

Page 12 1 a 1 : 2 b 1 : 1 c 1 : 3 d 3 : 1 e 7 : 11 f 9 : 8 g 4 : 3 h 2 : 21 i 1 : 2 : 3 j 2 : 1 k 5 : 4 l 3 : 4 2 a 1 : 20 b 3 : 2 c 3 : 50 d 1 : 14 e 1 : 6 f 3 : 1 g 5 : 12 h 1 : 4 3 5 : 3 4 2 : 5 5 5 : 16 6 16 : 25

Page 13 1 36 girls 2 160 g 3 a $16, $20 b $48, $32 4 $18 000 5 480 adults, 120 children 6 30°, 60° and 90°

Page 14 1 a $1.30 b $29.90 2 7.2 t 3 a $64 b 560 cm c 3200 L 4 $21 250 5 $32.50 6 a 8.125 L b 40 glasses

Pages 15–17 1 C 2 B 3 B 4 D 5 D 6 C 7 A 8 B 9 A 10 A 11 C 12 C 13 1.08×10^9 km 14 $27 000, $36 000, $45 000 15 495 g and 505 g 16 ± 0.20% 17 a $7\frac{1}{2}$ tablespoons b 8 L c 3 : 100 18 50 m/s