



CLASSIFIED

International Examinations Papers

Mob: +974 55373670 / 33787500
E-mail: chymrc.muhammad@gmail.com

MATHEMATICS - CORE

TOPIC- Ratio, Proportion and Percentages



1 Falla buys 3000 square metres of land for a house and garden.
The garden is divided into areas for flowers, vegetables and grass.

He divides the land in the following ratio.

$$\text{house : flowers : vegetables : grass} = 4 : 7 : 8 : 5$$

(a) (i) Show that the area of land used for flowers is 875 m^2 .

Answer(a)(i)

[2]

(ii) Calculate the area of land used for the house.

Answer(a)(ii) m^2 [2]

(b) Write down the fraction of land used for vegetables.
Give your answer in its simplest form.

Answer(b) [2]

- (c) During the first year Falla plants flowers in 64% of the 875 m².

Calculate the area he plants with flowers.

Answer(c) m² [2]

- (d) Falla sells some of the vegetables he grows.
These vegetables cost \$85 to grow.
He sells them for \$105.

Calculate his percentage profit.

Answer(d) % [3]

- (e) To buy the land Falla borrowed \$5000 at a rate of 6.4% **compound** interest for 2 years.

Calculate the **total** amount he pays back at the end of the 2 years.
Give your answer correct to the nearest dollar.

Answer(e) \$ [3]



- 2 Three children have some marbles.
Shireen has m marbles.
Nazaneen has three times as many marbles as Shireen.
Karly has 4 more marbles than Shireen.

(a) Write down an expression, in terms of m , for

- (i) the number of marbles Nazaneen has,

Answer(a)(i) [1]

- (ii) the number of marbles Karly has.

Answer(a)(ii) [1]

(b) The three children have a total of 84 marbles between them.

- (i) Write down an equation in m .

Answer(b)(i) [1]

- (ii) Solve your equation.

Answer(b)(ii) $m =$ [2]

- (c) Shireen weighs the 84 identical marbles.
Their total weight is 4.2 kg.

Calculate, in grams, the weight of one marble.

Answer(c) g [2]

(d) The children now decide to share the 84 marbles in the ratio

$$\text{Shireen} : \text{Nazaneen} : \text{Karly} = 2 : 7 : 3 .$$

Calculate the number of marbles each receives.

Answer(d) Shireen

Nazaneen

Karly [3]

3 Mrs Ali sold her house for \$600 000.

(a) She gives $\frac{2}{5}$ of the money to her son.

Work out how much her son receives.

Answer(a)\$ [1]

(b) Mrs Ali gives \$2400 to her grandchildren Elize, Sam and Juan in the ratio

$$\text{Elize : Sam : Juan} = 8 : 3 : 5.$$

Calculate how much they each receive.

Answer(b) Elize \$

Sam \$

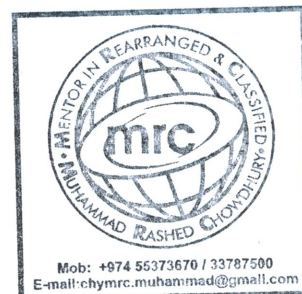
Juan \$ [3]

(c) Mrs Ali invests \$200 000 for 3 years at a rate of 4% per year compound interest.

Calculate the total amount of money she will have at the end of the 3 years.

Give your answer correct to the nearest dollar.

Answer(c) \$ [3]



0 4 A carton of fruit juice contains apple, orange, pineapple and tropical juices.

(a) They are mixed in the ratio

$$\text{apple : orange : pineapple : tropical} = 9 : 7 : 4 : 5.$$

The carton contains 540 millilitres of apple juice.

(i) Show that the total amount of fruit juice in the carton is 1.5 litres.

Answer(a)(i)

[3]

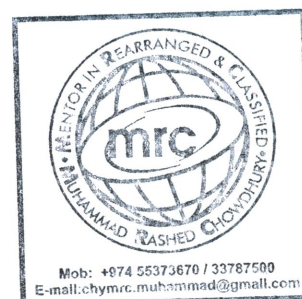
(ii) Calculate the amount of tropical juice in the carton.
Give your answer in millilitres.

Answer(a)(ii) ml [2]

(iii) 70% of the tropical juice is mango.

Calculate the amount of mango juice in the carton.

Answer(a)(iii) ml [2]



5 Simone makes a fruit cake.

- (a) (i) The recipe needs 175 g sugar, 200 g butter and 225 g flour.

Write the ratio sugar : butter : flour in its simplest form.

..... : : [2]

- (ii) The recipe needs a total of 600 g of fruit.
The ratio sultanas : currants : raisins = 4 : 3 : 1.

Work out the mass of each type of fruit.

Sultanas = g

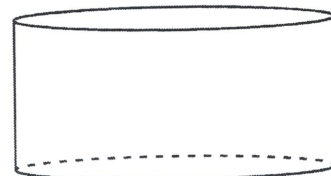
Currants = g

Raisins = g [3]

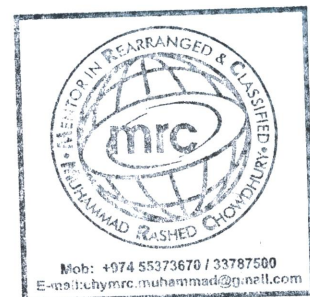
- (b) The cake can be made in either a cylindrical tin or a square-based tin.

- (i) The cylindrical tin has radius 10 cm.
In this tin the cake is 5 cm high.

Show that the volume of the cake is 1600 cm^3 ,
correct to 2 significant figures.



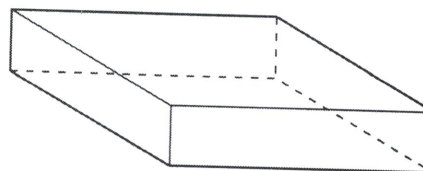
NOT TO
SCALE



[2]

- (ii) In the square-based tin, the cake is 4 cm high.
The volume of the cake is 1600 cm^3 .

Work out the length of a side of the base of this tin.



NOT TO SCALE

..... cm [2]

- (c) The mass, m grams, of the cake is 1340 g, correct to the nearest 20 g.

Complete the statement about the value of m .

..... $\leq m <$ [2]

- (d) The number of kilocalories (kcal) in **one quarter** of the cake is 1290 kcal.
The **whole cake** is cut into 12 equal pieces.

- (i) Calculate the number of kilocalories in one piece of cake.

..... kcal [2]

- (ii) The daily recommended number of kilocalories for Simone is 2000 kcal.

Work out the number of kilocalories in one piece of cake as a percentage of 2000 kcal.

..... % [1]

- 6 James and Wei have a car.
Each year James drives 3 600 km and Wei drives 4 800 km.

(a) Write 3 600 : 4 800 as a ratio in its simplest form.

Answer(a) : [1]

- (b) A garage charges \$420 to service the car.
James and Wei share the \$420 in the ratio James : Wei = 2 : 3.

Find the amount that James pays.

Answer(b) \$ [2]

- (c) On a 268 km journey the car uses 22.8 litres of fuel.

By writing these numbers to 1 significant figure, estimate the distance travelled using one litre of fuel.

Show all your working.

Answer(c) km [2]

- (d) On another journey the car uses 46.3 litres of fuel.
Fuel costs \$1.48 per litre.

Work out the cost of the fuel for this journey.

Answer(d) \$ [2]



(e) The table shows some information about the car.

Fuel tank capacity	64 litres (to the nearest litre)
Width	1810mm (to 3 significant figures)

For
Examiner's
Use

(i) Write down the upper bound of the fuel tank capacity.

Answer(e)(i) litres [1]

(ii) Write down the minimum width of the car.

Answer(e)(ii) mm [1]



07 Kylie, Rio and Choi buy a horse for \$21 600.

(a) They pay for the horse in the ratio Kylie:Rio:Choi = 2:3:4.

Calculate the amount that they each pay.

Answer(a) Kylie \$.....

Rio \$.....

Choi \$..... [3]

(b) It costs \$14 000 to keep the horse for one year.

(i) Food costs 30% of the \$14 000.

Calculate the cost of the food.

Answer(b)(i) \$..... [2]

(ii) Stable fees are \$8000.

Write this as a fraction of the \$14 000.
Give your answer in its lowest terms.

Answer(b)(ii) [2]

(iii) It costs \$600 for vets' fees and the rest of the \$14 000 is spent on equipment.

Work out how much is spent on equipment.

Answer(b)(iii) \$..... [2]

(c) They later sell the horse for \$17 280.

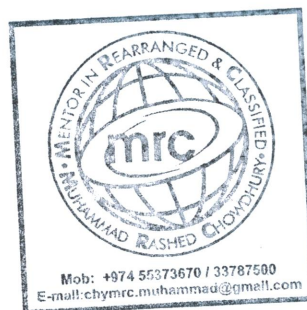
Calculate the percentage loss on the \$21 600 they paid for the horse.

Answer(c) % [3]

(d) Rio invests \$5500 for 3 years at a rate of 2.5% per year compound interest.

Calculate how much **interest** he receives after the 3 years.

Answer(d) \$..... [3]



8 Ben and Ruth own a company.

(a) The company's profits of \$43 680 are shared in the ratio Ben : Ruth = 2 : 5 .

Calculate Ruth's share of the profits.

Answer(a) \$ [2]

(b) Ruth invests \$15 000 at a rate of 4% per year simple interest.

Calculate how much her investment is worth at the end of 3 years.

Answer(b) \$ [3]

(c) The company employs 450 people.
14% of these people work in sales.

Calculate the number of people who work in sales.

Answer(c) [2]

(d) Every year Ben travels 32 000 km on business.

(i)

Car-rent
Cost (\$) = $600 + 0.35d$
where d is the distance travelled in kilometres

Calculate the cost of hiring a car from Car-rent to travel 32 000 km.

Answer(d)(i) \$ [2]

(ii)

Drive-easy
Cost = \$100 plus \$4 for every 10 km travelled

Calculate the cost of hiring a car from Drive-easy to travel 32 000 km.

Answer(d)(ii) \$ [2]

- 019 (a) Indira buys 1250 square metres of land to build a hotel.
Each square metre of land costs \$12.

Calculate the cost of the land.

Answer(a) \$ [1]

- (b) The cost of the land is 3% of the cost of the hotel.

Calculate the cost of the hotel.

Answer(b) \$ [2]

- (c) The hotel has 84 rooms.

The types of room are in the ratio family : double : single = 3 : 5 : 4.

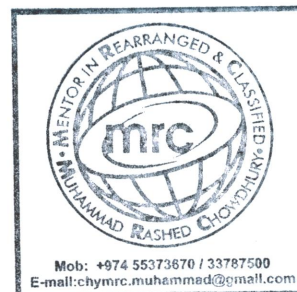
Calculate the number of double rooms.

Answer(c) [2]

- (d) Each single room is a cuboid, 4.5 m long, 3.2 m wide and 2.8 m high.

Calculate the volume of a single room.

Answer(d) m³ [2]



10 Adam owns a farm.

- (a) He plans to keep twenty hens.
He works out what he thinks this will cost.

Complete the following table.

Item	Cost (\$)
Equipment	500
20 hens costing \$12 each	
3 years supply of feed costing \$25 per month	
TOTAL	

[3]

- (b) The equipment actually costs \$600.

The ratio of costs is equipment : hens : feed = 5 : 3 : 9 .

- (i) Show that the total cost is now \$2040.

Answer(b)(i)

[2]

- (ii) Adam actually buys more than 20 hens, each costing \$12.

How many hens does he buy?

Answer(b)(ii) [2]

(c) Adam makes \$2920 from selling his hens' eggs.

Calculate his percentage profit on the \$2040.

Answer(c) % [2]

(d) Adam borrows \$1500 for 3 years at a rate of 5.5% per year compound interest.

Calculate the interest he will pay, correct to the nearest cent.

Answer(d) \$ [3]



11 An area of $94\,500\text{ m}^2$ in a city is developed.

(a) The area is divided into housing, shops and a park in the ratio

$$\text{housing} : \text{shops} : \text{park} = 7 : 6 : 5.$$

(i) Show that the area of the park is $26\,250\text{ m}^2$.

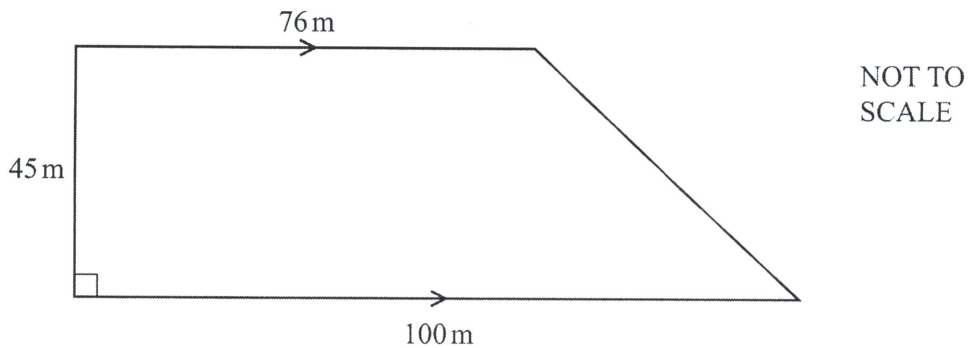
Answer(a)(i)

[2]

(ii) Calculate the area for housing.

Answer(a)(ii) m^2 [1]

(b) The diagram shows the children's playground in the park.



(i) Calculate the area of the playground.

Answer(b)(i) m^2 [2]

(ii) What fraction of the area of the park does the playground occupy?

Answer(b)(ii) [1]

(c) Buildings occupy $30\,625\text{ m}^2$ of the area for housing.

Calculate the percentage of the area for housing occupied by buildings.

Answer(c) % [1]

(d) Of the buildings, $\frac{5}{12}$ are bungalows and $\frac{3}{8}$ are houses.

The rest of the buildings are apartments.

(i) Complete these equivalent fractions.

$$\frac{5}{12} = \frac{\quad}{24} \qquad \frac{3}{8} = \frac{\quad}{24} \qquad [2]$$

(ii) Show that $\frac{5}{24}$ of the buildings are apartments.

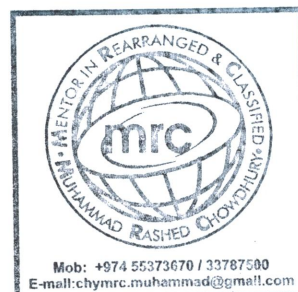
Answer(d)(ii)

[1]

(iii) There are 120 buildings altogether.

Work out the number of houses.

Answer(d)(iii) [1]



12 Ravi sells cars.

(a) He has a total of 144 cars for sale.

(i) 64 of these cars are 3 or more years old.

What fraction of the cars are **less than** 3 years old?
Give your answer in its simplest form.

Answer(a)(i) [2]

(ii) Some of the 144 cars use petrol, some use diesel and some are electric cars.
The ratio of petrol to diesel to electric cars is 6 : 5 : 1 .

Work out the number of these cars that use diesel.

Answer(a)(ii) [2]

(b) Lola buys a car from Ravi.

There are two ways she can pay for the car.

Option 1: one payment of \$5200 .

Option 2: a payment of $\frac{2}{5}$ of \$5200 plus 24 monthly payments, each of \$175 .

Work out how much **more** Lola pays using Option 2 than Option 1.

Answer(b) \$ [3]

(c) For one week, Ravi reduces all his car prices by 15%.
The price of a car was \$3450.

Show that the reduced price of the car is \$2932.50 .

Answer(c)

[2]

(d) Ravi buys a car for \$2500 .
He sells it for \$3300 .

Calculate his percentage profit.

Answer(d) % [3]

13 Sonia works in a toy shop.

(a) (i) One week she works for 30 hours and is paid \$180.

Calculate the amount she is paid per hour.

Answer(a)(i) \$..... [1]

(ii) The next week Sonia works for 38 hours and is paid \$220.

Find the difference in her pay per hour for these two weeks.

Answer(a)(ii) \$..... [2]

(b) The shop sells bags of 40 marbles.

One bag has marbles in the ratio red : blue : green = 1 : 3 : 4.

(i) Calculate the number of marbles of each colour.

Answer(b)(i) Red =, blue =, green = [2]

(ii) A second bag of 40 marbles contains 11 red marbles, 9 blue marbles and 20 green marbles.
All the marbles from the two bags are mixed together.

Write down the ratio of marbles red : blue : green.
Give your answer in its simplest form.

Answer(b)(ii) : : [2]

(c) Thilo and Toby buy some boats and trains from the toy shop.
The cost of one boat is b cents and the cost of one train is t cents.

(i) Toby buys 3 boats and 4 trains for \$5.70 .

Complete this equation.

$$3b + 4t = \dots\dots\dots$$

[1]

(ii) Thilo buys 1 boat and 2 trains for \$2.40 .

Write this information as an equation.

$$\dots\dots\dots = \dots\dots\dots$$

[2]

(iii) Solve your two equations to find the cost of a boat and the cost of a train.
You must show all your working.

Answer(c)(iii) Cost of a boat = $\dots\dots\dots$ cents

Cost of a train = $\dots\dots\dots$ cents [3]

(d) Train track costs 99 cents per 20 cm.

Calculate the cost of buying 3.4 metres of train track.

Answer(d) \$ $\dots\dots\dots$ [3]



14 (a) The angles in a triangle are in the ratio 3:4:8.

(i) Show that the smallest angle of the triangle is 36° .

Answer(a)(i)

[2]

(ii) Work out the other two angles of the triangle.

Answer(a)(ii) and [2]

(b) Another triangle ABC has angle $BAC = 35^\circ$ and angle $ABC = 65^\circ$.

(i) Using a protractor and straight edge complete an accurate drawing of the triangle ABC .
The side AB has been drawn for you.



[2]

(ii) Measure the length, in centimetres, of the shortest side of your triangle.

Answer(b)(ii) cm [1]

(c) A different triangle has base 7.0 cm and height 5.6 cm.
Calculate the area of this triangle, giving the units of your answer.

Answer(c) [3]

15 Indira makes a playground for children.

- (a) She borrows \$40 000 for 5 years at a rate of 3.6% per year simple interest.

Calculate the total amount she will owe at the end of 5 years.

Answer(a) \$ [3]

- (b) Bandhura works at the playground for 28 hours.

She is paid \$15.85 per hour.

Calculate the total amount Bandhura is paid.

Answer(b) \$ [1]

- (c) To visit the playground each adult pays \$1.25 and each child pays \$3.50 .

One day 24 adults and 32 children visit the playground.

Calculate how much they pay altogether.

Answer(c) \$ [3]

- (d) On another day 180 people visit the playground.

These people are in the ratio

adults : boys : girls = 3 : 2 : 7.

Calculate the numbers of adults, boys and girls.

Answer(d) Adults =

Boys =

Girls = [3]

16 A sweet shop sells lots of different types of sweets.

- (a) (i) Each large bag of mixed sweets is divided in the ratio mints : jellies : toffees = 5 : 2 : 8.
Each large bag has a total of 180 sweets.

Calculate the number of sweets of each type in a large bag.

Answer(a)(i) Mints =

Jellies =

Toffees =[3]

- (ii) The mass, m grams, of a small bag of sweets is 75 g, correct to the nearest gram.

Complete the statement about the value of m .

Answer(a)(ii)..... $\leq m <$ [2]

- (b) There are 156 g of sugar in a 240 g bar of chocolate.

- (i) Write 156 as a percentage of 240.

Answer(b)(i) % [1]

- (ii) Work out the number of grams of sugar in a 1.2 **kilogram** bar of chocolate.

Answer(b)(ii) g [2]

- (iii) Another bar of chocolate is made.
The mass is 35% greater than the 240 g bar.

Work out the mass of this chocolate bar.

Answer(b)(iii) g [2]



17 At a theatre, adult tickets cost \$5 each and child tickets cost \$3 each.

(a) Find the total cost of 110 adult tickets and 85 child tickets.

Answer(a) \$ [2]

(b) The total cost of some tickets is \$750.
There are 120 adult tickets.

Work out the number of child tickets.

Answer(b) [2]

(c) The ratio of the **number** of adults to the **number** of children during one performance is

adults : children = 3 : 2.

(i) The total number of adults and children in the theatre is 150.

Find the number of adults in the theatre.

Answer(c)(i) [2]

(ii) For this performance, find the ratio **total cost** of adult tickets : **total cost** of child tickets.
Give your answer in its simplest form.

Answer(c)(ii) : [3]

(d) The \$5 cost of an adult ticket is increased by 30%.

Calculate the new cost of an adult ticket.

Answer(d) \$ [2]

(e) The cost of a child ticket is reduced from \$3 to \$2.70.

Calculate the percentage decrease in the cost of a child ticket.

Answer(e) % [3]

18 A wildlife park covers an area of 18 hectares.

(a) The 18 hectares is divided between enclosures, paths and buildings in the ratio

$$\text{enclosures} : \text{paths} : \text{buildings} = 11 : 14 : 5.$$

(i) Show that the area for enclosures is 6.6 hectares.

[1]

(ii) Calculate the area for paths and the area for buildings.

Paths hectares

Buildings hectares [2]

(b) Of the 6.6 hectares for enclosures, $\frac{7}{11}$ is for mammals and 30% is for reptiles.

Calculate the area for mammals and the area for reptiles.

Mammals hectares

Reptiles hectares [2]



(c) The table shows the opening times of the wildlife park.

Days	Opening times
Monday to Friday	09 30 to 17 15
Saturday and Sunday	10 00 to 18 30

(i) Work out how long, in hours and minutes, the wildlife park is open on a Wednesday.

..... h min [1]

(ii) Calculate the total time, in hours and minutes, that the wildlife park is open in one week.

..... h min [2]

(d) This table shows the ticket prices for the wildlife park.

Adult	\$11.00
Senior (age 65 and over)	\$9.25
Child (age 4 to 16)	\$7.50
Child (age 3 and under)	Free

Mr Lu visits the wildlife park with his wife, their children (aged 6 and 2) and his parents (both aged 67).

(i) Work out the total cost of the tickets for this visit.

\$..... [2]

(ii) Mr Lu has a voucher for the wildlife park that reduces the total cost of the tickets to \$42.

Calculate the percentage saving.

.....% [3]

19 Camilla joins a soccer club.
The total cost of joining is made up of membership, kit and travel.

(a) The ratio membership : kit : travel = 3 : 5 : 6.
The cost of membership is \$78.

(i) Show that the total cost of joining is \$364.



[1]

(ii) Calculate the cost of the kit and the cost of the travel.

Kit = \$

Travel = \$ [3]

(b) Camilla's father pays $\frac{10}{13}$ of the \$364.
Camilla pays the rest.

Calculate how much she pays.

\$ [2]

(c) Camilla's brother joins the soccer club.
He receives a 12% discount on the \$364 because he is younger than Camilla.

Calculate the total cost of joining for him.

\$ [2]

- 20 (a) Lei earns \$6.75 per hour.
One week she works for 37 hours.

How much does she earn this week?

Answer(a) \$..... [1]

- (b) One month Lei earns \$1080.
20% of her earnings are taken off for tax.

Show that the amount of money she has left is \$864.

Answer(b)

[1]

- (c) Lei divides \$864 in the ratio bills: spending money: savings = 9:4:2.

- (i) Work out how much spending money she has.

Answer(c)(i) \$..... [2]

- (ii) What fraction of the \$864 does she use for bills?
Give your answer in its simplest form.

Answer(c)(ii) [2]

(d) Lei wants to buy a computer.

(i)

Computer \$425 + sales tax

The sales tax is 15%.

Work out the total cost of this computer.

Answer(d)(i) \$..... [2]

(ii) Lei goes on holiday to London.

The exchange rate between dollars and pounds (£) is $\$1 = \pounds 0.52$.

The total cost of the same computer in London is £235.

Work out how much less, in pounds, the computer costs in London.

Answer(d)(ii) £..... [2]

(e) Lei inherits \$1400.

She spends \$175 on a camera.

(i) Work out \$175 as a percentage of \$1400.

Answer(e)(i) % [1]

(ii) Lei invests the remaining \$1225 for 3 years at a rate of 4.5% per year compound interest.

How much interest does she receive after 3 years?

Answer(e)(ii) \$..... [3]

- 21 (a) Vince and Wendy share \$2000 in the ratio Vince : Wendy = 19 : 21.

Calculate the amount of money that Vince receives.

Answer(a) \$ [2]

- (b) Wendy has \$265 to spend on some chairs.
The chairs cost \$37 each.

Work out the largest number of chairs she can buy.

Answer(b) [2]

- (c) Wendy shares \$200 between her three children Jake, Karl and Lana.

She gives 27% of the money to Jake and $\frac{2}{5}$ of the money to Karl.

Work out the amount of money she gives to Lana.

Answer(c) \$ [3]

- (d) Wendy invests \$500 at a rate of 4% per year **compound** interest.

Calculate the total amount of **interest** she receives at the end of 2 years.
Give your answer correct to the nearest dollar.

Answer(d) \$ [4]

- 2 2 (a) Each day from Monday to Saturday Caroline buys a newspaper, costing d cents.
On Sunday she buys a newspaper costing 160 cents.
The total amount she spends on newspapers in a week is 430 cents.

(i) Write down an equation in d , to show this information.

Answer(a)(i) [1]

(ii) Solve your equation to find d .

Answer(a)(ii) $d =$ [2]

(iii) The price of the Sunday newspaper is increased by 15%.

Calculate the price of the Sunday newspaper after this increase.

Answer(a)(iii) cents [2]

(b) Potatoes cost p cents per kilogram and carrots cost c cents per kilogram.

(i) Bernard buys 3 kilograms of potatoes and 2 kilograms of carrots.
An expression for the amount he spends is $3p + 2c$.
He spends 92 cents on these items.

Write down an equation, in p and c , to show this.

Answer(b)(i) [1]

(ii) Eleanor buys 2 kilograms of potatoes and 5 kilograms of carrots.
She spends 153 cents on these items.

Write down an equation, in p and c , to show this.

Answer(b)(ii) [2]

(iii) Solve your equations to find p and c .

Answer(b)(iii) $p =$

$c =$ [4]

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23 Mrs Singh and Mr Patel are teachers.
They take their two classes to the theatre to see a play.

- (a) (i) Mrs Singh has 20 girls in her class.
The ratio of girls : boys = 5 : 3.

Show that Mrs Singh has 32 students in her class.

[2]

- (ii) Mr Patel has 40 students in his class.
The ratio of girls : boys = 3 : 2.

For the 72 students in the two classes, work out the ratio of

total number of girls : total number of boys.

Give your answer in its simplest form.

..... : [4]

(b)

Ticket price	
Student	\$5.75
Teacher	\$8.25

For every 25 students, one teacher receives a free ticket.

Four teachers go to the theatre with the 72 students.

Calculate the total cost of the tickets.

\$ [3]

- (c) The play is in three parts.
 Each part lasts for 45 minutes.
 There is a 20 minute interval between each part.
 The first part starts at 13 30.

Work out the time that the play ends.

..... [2]

- (d) Mr Patel pays \$3.60 for a programme.
 Last year, the price of a programme was \$3.20 .

Calculate the percentage increase in the price of a programme.

..... % [3]

- (e) The probability that a student loses their theatre ticket is $\frac{1}{18}$.

- (i) Write down the probability that a student does not lose their ticket.

..... [1]

- (ii) Work out how many of the 72 students you would expect to **lose** their ticket.

..... [1]



24

Here is part of the menu in a café.

Item	Price
Tea.....	\$2.40
Coffee.....	\$2.80
Fruit juice.....	\$1.85
Pizza.....	\$4.15
Vegetable pasty...	\$3.60
Chicken curry.....	\$5.20
Ice cream.....	\$2.80
Cake.....	\$3.25
Yoghurt.....	\$1.40

- (a) Jenna buys 3 coffees and 2 cakes.

Work out how much she spends altogether.

\$ [3]

- (b) Find the maximum number of pizzas Harry can buy for \$20.
Work out the change he receives from a \$20 note.

Number of pizzas =

Change = \$ [3]

- (c) Priti's meal costs \$7.60 .
She gives the waitress 15% extra for service.

Work out the total amount she pays.

\$ [2]

- (d) Elena and Maria are waitresses in the café.
One day they receive \$96 for service.
They share the \$96 in the ratio Elena : Maria = 3 : 1.

Work out how much Elena receives.

\$ [2]

(e) The café's opening hours are shown below.

Day	Opening hours
Monday	CLOSED
Tuesday	11 00 to 15 00 and 17 00 to 22 00
Wednesday	11 00 to 15 00 and 17 00 to 22 00
Thursday	11 00 to 15 00 and 17 00 to 22 00
Friday	11 00 to 15 00 and 17 00 to 22 00
Saturday	10 30 to 23 00
Sunday	09 30 to 21 00

(i) Find the number of hours the café is open during one week.

..... hours [2]

(ii) During opening hours the café needs 3 people on duty.
Each person works 36 hours in a week.

Find the number of people the café needs in a week.

..... [3]

(f) The café owner pays rent.
The **monthly** rent is \$6.40 for each square metre of floor area.
The floor area is 72.5 m^2 .

Calculate the **total** rent the café owner pays in one year.

\$ [3]

25 (a) Luka earns \$475 each week.

(i) He works for 38 hours each week.

How much does he earn for each hour he works?

Answer(a)(i) \$ [1]

(ii) Luka pays \$175 in rent each week.

Write the amount he pays in rent as a fraction of his weekly earnings.
Give your answer in its lowest terms.

Answer(a)(ii) [2]

(iii) He spends $\frac{7}{20}$ of his weekly earnings on bills.

How much money does he have left after paying rent and bills?

Answer(a)(iii) \$ [2]

(b) Luka's weekly earnings of \$475 are increased by 6%.

Calculate his new weekly earnings.

Answer(b) \$ [2]

(c) Luka has saved \$350.

He invests this for 2 years at a rate of 4% per year compound interest.

How much interest does he receive after 2 years?

Answer(c) \$ [3]

(e) The total hotel income for the first year was \$992 000.

(i) The hotel spent $\frac{3}{8}$ of the total hotel income on staff wages.

Calculate the staff wages.

Answer(e)(i) \$ [1]

(ii) The hotel also spent \$420 000 on food.

Calculate how much of the total hotel income was left.

Answer(e)(ii) \$ [2]

(iii) Calculate \$420 000 as a percentage of \$992 000.
Give your answer correct to 1 decimal place.

Answer(e)(iii) % [2]

(f) To make improvements, Indira borrows \$3 500 at a rate of 6% per year simple interest.
She pays back all the amount at the end of 3 years.

Calculate the total amount she needs to repay.

Answer(f) \$ [3]

26 (a) Juan takes his car to a garage for repairs.

Complete his bill.

<u>Item</u>	<u>Price (\$)</u>
Service	475.00
3 tyres at \$86 each
4.5 litres of oil at \$5.68 per litre

Total

[3]

(b) Juan buys a van costing \$4400.
He pays a deposit of \$3740.

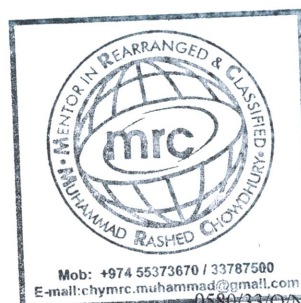
(i) Work out \$3740 as a percentage of \$4400.

..... % [1]

(ii) He borrows the rest of the money for one year at a rate of 12% per year simple interest.

Work out how much he pays back at the end of one year.

\$..... [3]



- (c) Juan pays \$321 for insurance.
He makes 12 equal payments.

Work out each payment.

\$..... [1]

- (d) Juan's car travels 12.4 km and uses 1 litre of fuel.
His van travels 1 km and uses 0.0792 litres of fuel.

Using 1 litre of fuel, which vehicle travels further?
Explain how you decide.

..... travels further because

..... [2]

- (e) In 2015 the total cost of repairs and fuel for his van was \$4200.
These costs are in the ratio repairs : fuel = 1 : 2.

Find the cost of the fuel.

\$..... [2]

- 27 A family of 2 adults and 3 children are on holiday.
They each hire a mountain bike from the hotel.

Large mountain bike		Small mountain bike	
First hour	Each extra hour	First hour	Each extra hour
\$6	\$2	\$3.60	\$1.20

- (a) The family hire 2 large and 3 small mountain bikes for 5 hours.
(i) Work out the total cost.

Answer(a)(i) \$ [3]

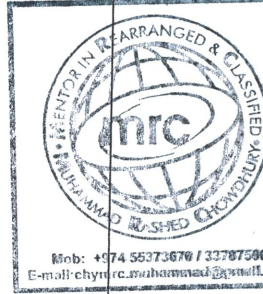
- (ii) The hotel gives the family a discount of 15% on the total cost.
Work out how much the family pays.

Answer(a)(ii) \$ [2]

- (b) A wheel of a large bike has a radius of 32 cm.

- (i) Calculate the circumference of a wheel of a large bike.

Answer(b)(i) cm [2]

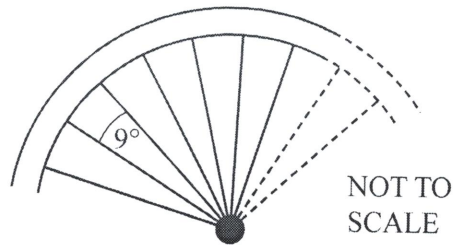


(ii) The family cross a bridge which is 24 m long.

Calculate how many **complete** turns a wheel of a large bike makes to cross the bridge.

Answer(b)(ii) [2]

(c) The diagram shows part of a wheel of a large bike.
There is an angle of 9° between two metal spokes.
Each spoke is 29 cm long.



Calculate the total length of metal, in metres, needed to make the spokes for one wheel.

Answer(c) m [3]

Question 10 is printed on the next page.

- 28 (a) Kasem earns \$900 each month.
14% of this amount is deducted for tax and insurance.

Show that he receives \$774 each month.

Answer(a)



[2]

- (b) He pays $\frac{2}{9}$ of the \$774 in rent.

Calculate the amount of rent he pays.

Answer(b) \$ [1]

- (c) Kasem spends \$480 each month on food, entertainment and clothes.
He shares this in the ratio

food : entertainment : clothes = 9 : 3 : 4.

Calculate how much he spends on food each month.

Answer(c) \$ [2]

- (d) Kasem saves the rest of his money.

Work out the amount he saves as a percentage of \$774.

Answer(d) % [2]

29 Adriano hires a car.
The cost of hiring the car is \$36 per day plus 24 cents for each kilometre travelled.
He hires the car for 5 days and travels a total of 660 km.

(a) (i) Calculate the cost to hire the car.

Answer(a)(i) \$ [3]

(ii) 15% tax is then added to this cost.
Calculate the total cost of hiring the car including tax.

Answer(a)(ii) \$ [2]

(b) The car uses one litre of fuel to travel 11 km.
Fuel costs \$1.80 per litre.

(i) Work out the number of litres used to travel the 660 km.

Answer(b)(i) litres [1]

(ii) Work out the cost of this fuel.

Answer(b)(ii) \$ [1]

(iii) Find the total cost of hiring the car including tax and the fuel used.

Answer(b)(iii) \$ [1]

(c) During the 5 days Adriano earns \$1600.

What percentage of his earnings is your answer to **part (b)(iii)**?
Give your answer correct to the nearest whole number.

Answer(c)% [2]

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For
Examiner's
Use

- 30 (a) A shop has maps arranged in bookcases.
- (i) The length of one wall in the shop is 7.35 m.
Each bookcase is 120 cm wide.

Work out the maximum number of bookcases that will fit along this wall.

Answer(a)(i) [2]

- (ii) Each bookcase weighs 45 kg correct to the nearest 5 kg.

Write down the upper bound for the weight of a bookcase.

Answer(a)(ii) kg [1]

- (b) During July and August the shop sells a total of 160 maps.
Some of these maps are driving maps and the rest are walking maps.

- (i) Complete the table below.

	Driving maps	Walking maps	Total
July		15	
August	65		
Total		40	160

[2]

- (ii) Write down the fraction of the total number of **walking** maps that are sold in July.
Give your answer in its simplest form.

Answer(b)(ii) [2]

- (c) The shopkeeper buys each map for \$5.50 .
He sells each map for \$6.60 .

(i) Calculate his percentage profit.

Answer(c)(i) % [3]

- (ii) Each map has a price in dollars (\$) and euros (€).
The price is \$6.60 or €3.52 .

Work out the exchange rate for €1 .

Answer(c)(ii) €1 = \$ [2]

- (d) The shop is open for 312 days each year.
The shopkeeper pays 3 employees \$47.66 each per day.

The total annual wage bill for the three employees is given by

$$3 \times 312 \times 47.66 .$$

- (i) Rewrite this calculation so that **each** number is rounded to 1 significant figure.

$$3 \times \dots \times \dots \quad [1]$$

- (ii) Use your answer to **part (d)(i)** to work out an estimate for the total annual wage bill.

Answer(d)(ii) \$ [1]



31 (a) Luis buys a season ticket to watch his local football team.
The season ticket costs \$595.

(i) Luis buys the season ticket online and gets a 5% discount on the \$595.

Work out how much Luis pays for the season ticket online.

Answer(a)(i) \$..... [2]

(ii) A ticket to watch one match costs \$38.
Luis watches 16 matches.

How much did Luis save by buying a season ticket online instead of 16 tickets at \$38 each?

Answer(a)(ii) \$..... [2]

(b) The football stadium has 26 272 seats.
The number of people who attend one match is 23 854.

Calculate the percentage of the 26 272 seats that are **empty**.

Answer(b) % [2]

(c) The total number of people attending matches at the stadium last season was 506 762.

Write 506 762 in standard form, correct to 3 significant figures.

Answer(c) [2]

32 The Wong family spend the day at the zoo.

(a) The Wong family has 2 adults and 3 children aged 2, 5 and 11 years old.

Admission	
Adults	\$8.50
Children 11-16 years	\$6.00
Children 3-10 years	\$4.50
Children under 3 years	FREE



Mr Wong pays for his family to go into the zoo using a \$50 note.

Work out the change he receives.

Answer(a) \$ [3]

(b) The dolphin show finishes at 11 05.
It lasts for 1 hour and 20 minutes.

Write down the time the dolphin show starts.

Answer(b) [1]

(c) Torty the tortoise was born on 27 December 1898.

Work out how many years old she was on 3 January 2003.

Answer(c) years [1]

(d) Last year, the ratio snakes : lizards = 3 : 5 .
There were 45 lizards.

(i) Work out how many snakes there were last year.

Answer(d)(i) [2]

(ii) This year, there are 3 more snakes and the same number of lizards.

Write down the new ratio snakes : lizards.
Give your answer in its simplest form.

Answer(d)(ii) : [2]

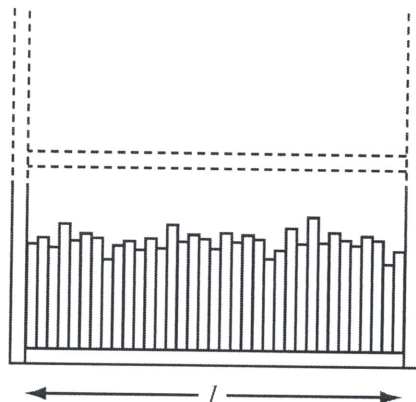
(e) Mr Wong hires a vehicle to drive around the zoo.
The cost is \$25 for the first hour and \$7.50 for every extra half hour.
He pays \$85 altogether.

For how long does he hire the vehicle?

Answer(e) hours [3]

Answer **all** the questions.

- 3 3** A bookcase is **full** of books.
One shelf holds exactly 35 books.
Each book is 3.2 cm wide.



- (a) Calculate l , the length of one shelf.

Answer(a) $l =$ cm [1]

- (b) The bookcase contains 6 of these shelves.

Calculate the total number of books in the bookcase.

Answer(b) [1]

- (c) The books cost \$6 each or \$9 each.

The ratio of \$6 books to \$9 books in the bookcase is 6 : 9.

- (i) Write this ratio in its simplest form.

Answer(c)(i) : [1]

- (ii) Find the number of \$6 books in the bookcase.

Answer(c)(ii) [2]

- (iii) Find the **total** cost of all the books in the bookcase.

Answer(c)(iii) \$ [2]



3 4 A building company buys 4 square kilometres of land.
On the land the company builds houses, shops and a school.

(a) Show that 4 square kilometres is equivalent to 4 000 000 square metres.

Answer(a)

[1]

(b) The company uses 5% of the land for roads and paths.

Show that the remaining area of land is 3 800 000 m².

Answer(b)

[1]

(c) The 3 800 000 m² of land is divided in the ratio houses : shops : school = 11 : 5 : 3.

(i) Show that the area for the school is 600 000 m².

Answer(c)(i)

[2]

(ii) Calculate the area for houses.

Answer(c)(ii) m² [1]

(iii) 140 m² is needed for each house.

Calculate, correct to the nearest 10, the number of houses that can be built.

Answer(c)(iii) [2]

- (d) $\frac{3}{5}$ of the school area is for classrooms and $\frac{1}{8}$ is for other rooms.

The remainder is for sporting facilities.

- (i) **Without using a calculator**, and showing all your working, find the fraction of the school area for sporting facilities.

Answer(d)(i) [3]

- (ii) The school has an area of 600 000 m².

Work out the area for sporting facilities.

Answer(d)(ii) m² [1]

- (e) To pay for materials, the building company borrows \$250 000 from a bank for 3 years. The bank charges compound interest at a rate of 4% per year.

Calculate the **total** amount the company must pay back at the end of 3 years.

Answer(e) \$ [3]

35 (a) Jasmine works for 38 hours each week and she earns \$12.15 each hour.

(i) Calculate her earnings in one week.

Answer(a)(i) \$ [1]

(ii) Jasmine pays 14% of her earnings in tax.

Calculate how much money she has left after tax is paid.

Answer(a)(ii) \$ [2]

(iii) She pays $\frac{1}{3}$ of the money she has left after tax in rent.

Calculate how much rent she pays in one year (52 weeks).

Answer(a)(iii) \$ [2]

(iv) In one week she spends \$140 on food and electricity in the ratio

$$\text{food : electricity} = 3 : 2 .$$

Calculate how much she spends on food.

Answer(a)(iv) \$ [2]

(b) Jasmine buys a watch for 10 000 Japanese Yen (¥).

The exchange rate is \$1 = ¥ 80.4 .

Calculate the cost of this watch in dollars, giving your answer correct to the nearest dollar.

Answer(b) \$ [3]

36 Khamisi is trying to reach the standard required for competing in an international athletics competition.

(a) He arrives home from college at 16 15.
He divides his time before going to bed between training, studying and eating.

(i) He spends $3\frac{1}{4}$ hours training.

Show that $3\frac{1}{4}$ hours is equivalent to 195 minutes.

Answer(a)(i)

[1]

(ii) He spends $2\frac{1}{2}$ hours studying and 45 minutes eating.

Work out the time he goes to bed.

Answer(a)(ii) [2]

(iii) Find, in its simplest form, the ratio training : studying : eating.

Answer(a)(iii) Training : studying : eating = : : [2]

(b) Khamisi divides his 195 minutes training into three sessions.

- 40% of the time on the running track
- $\frac{2}{13}$ of the time with his trainer
- the remaining time in the gym

Calculate the time, in minutes, he spends

(i) on the running track,

Answer(b)(i) min [1]

(ii) with his trainer,

Answer(b)(ii) min [1]

(iii) in the gym.

Answer(b)(iii) min [1]

- (c) Khamisi is a sprinter and he wants to qualify for the 200 metres race.
His best time is 22.5 seconds and the qualifying time is 20.7 seconds.

Calculate the percentage decrease in his best time needed in order to reach the qualifying time.

Answer(c) % [3]



37 (a) Mei is paid \$15.25 for each hour she works.

(i) Work out how much she is paid when she works for 8 hours.

\$ [1]

(ii) Mei gets a pay increase.
She is paid 8% more for each hour she works.
Mei works for 38 hours each week.

Work out how much Mei earns each week after the pay increase.

\$ [3]

(b) Xia works in France.
She is paid 425 euros each week.
The exchange rate between euros (€) and dollars is €1 = \$1.45 .

Work out who earns more each week, Mei or Xia, and by how much.
Give your answer in dollars.

..... earns more by \$ [3]

(c) Mei invests \$500 in a bank at a rate of 3.5% per year compound interest.

Calculate the **total** amount of money she will receive at the end of 3 years.

\$ [3]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average temperature in °C	-4.4	-4.2	-2.7	0.3	4.8	9.1	11.8	10.8	6.7	2.7	-1.1	-3.3

The table shows the average temperature for Tromso, Norway each month.

- (a) (i) Write down the month which had the highest average temperature.

Answer(a)(i) [1]

- (ii) How much warmer was it in September than in February?

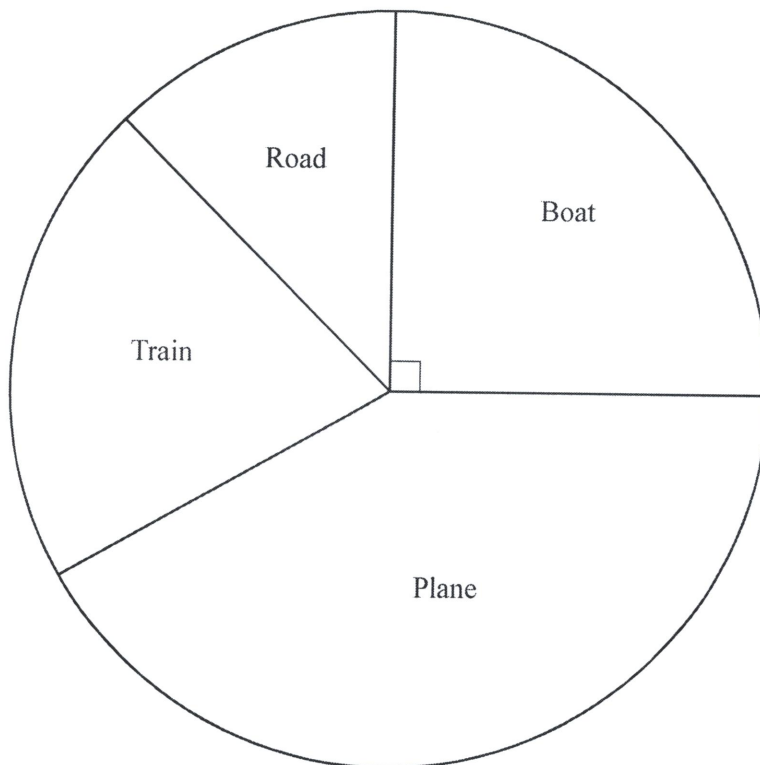
Answer(a)(ii) °C [1]

- (iii) The lowest temperature in October was 12.3°C below the average temperature for that month.

Work out the lowest temperature in October.

Answer(a)(iii) °C [1]

- (b) In a survey, some tourists were asked how they had travelled to Norway.
The pie chart shows the results.





- (i) 150 of these tourists travelled by boat.
Show that 600 tourists took part in the survey.

Answer(b)(i)

[1]

- (ii) Calculate the number of these tourists who travelled by plane.

Answer (b)(ii) [3]

- (c) A train ticket from Oslo to Stavanger costs 885 krone.
There is a discount of 12% on the total cost of the tickets for a group of 10 or more people.

Calculate the cost of tickets for a group of 15 people.

Answer(c) krone [3]

- (d) On 1 January 2000, the population of Norway was 4 480 000, correct to 3 significant figures.

- (i) Write this number in standard form.

Answer(d)(i) [1]

- (ii) On 1 January 2011, the population of Norway was 4 920 000, correct to 3 significant figures.

Calculate the percentage increase in the population.

Answer(d)(ii) % [3]

39 (a) Here is a list of ingredients to make 18 chocolate chip biscuits.

butter	130 g
sugar	60 g
flour	180 g
chocolate chips	30 g

Work out how much of each ingredient you need to make 45 biscuits.

butter g

sugar g

flour g

chocolate chips g [3]

(b) In a recipe for bread, $\frac{5}{8}$ of the mass of bread mixture is flour.
Paul uses 395 g of flour.

(i) What mass of bread mixture does he make?

..... g [2]

(ii) Write your answer to **part(b)(i)** in kilograms.

..... kg [1]

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4 0 Francesca owns a business.
One year she has a total of \$6000 to spend on rent, furniture and office equipment.

(a) (i) The rent is \$400 per month.

Work out how much Francesca spends on rent in this year.

\$ [1]

(ii) Desks cost \$58.50 each and chairs cost \$15 each.
Francesca buys 2 desks and 5 chairs.

Work out how much Francesca spends on furniture.

\$ [2]

(iii) Francesca also spends \$800 on office equipment.

Work out how much remains of the \$6000.

\$ [2]

(iv) She spends this remaining amount on boxes of paper.
Paper costs \$4.95 per box.

Work out how many boxes she buys.

..... boxes [2]

(b) Francesca needs to buy computer equipment.
She borrows \$2000 from a bank for 3 years at a rate of 5% per year compound interest.

Calculate the total amount she pays back at the end of the 3 years.

\$ [3]

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4 1 Today it is Simon's birthday.

- (a) Simon is x years old.
Katy is twice as old as Simon.
Bob is 8 years younger than Simon.

(i) Write expressions, in terms of x , for the ages of Katy and Bob.

Answer(a)(i) Katy

Bob [2]

(ii) The sum of their three ages is 40 years.

Write an equation in terms of x .

Answer(a)(ii) [1]

(iii) Solve your equation for x .

Answer(a)(iii) $x =$ [2]

(b) Simon's birthday cake weighs 600 grams.

He eats $\frac{1}{8}$ of the cake.

Katy eats 25% of the cake.

Bob eats 0.3 of the cake.

Find the weight of the cake that is left.

Answer(b) g [4]

- (c) Aunty Millie gives Simon \$150 for his birthday.
He invests the money in a bank at a rate of 6% per year compound interest.

Calculate the **total** amount Simon will have after 3 years.



Answer(c) \$..... [3]

- (d) One of Simon's presents is a bag of sweets.
He decides to eat the sweets in a sequence.
On day 1 he eats 1 sweet, on day 2 he eats 5 sweets, on day 3 he eats 9 sweets and so on.

- (i) Describe in words the rule for continuing the sequence 1, 5, 9, 13, 17

Answer(d)(i) [1]

- (ii) Write down an expression for the number of sweets he eats on day n .

Answer(d)(ii) [2]

4 2 (b) A shopkeeper pays \$36 for 16 cartons.

(i) How much does he pay for one carton?



Answer(b)(i) \$..... [1]

(ii) He sells $\frac{7}{8}$ of the 16 cartons for \$3.40 each and the rest for \$2.50 each.

Calculate the total amount he receives from selling the cartons.

Answer(b)(ii) \$..... [2]

(iii) Calculate his percentage profit.

Answer(b)(iii)% [3]
