UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

6828773900

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/04**

Paper 4 (Extended) **May/June 2010**

2 hours 15 minutes

Candidates answer on the Question Paper

Additional Materials: Geometrical Instruments
Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.
You may use a pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.

Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.

You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 120.

For Examiner's Use

This document consists of **18** printed pages and **2** blank pages.

Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

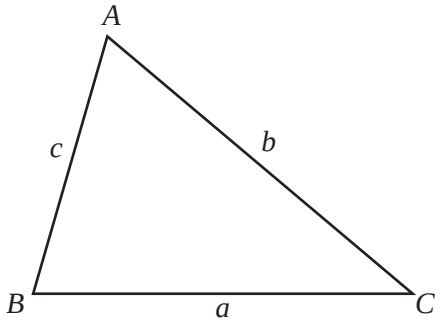
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \dfrac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \dfrac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \dfrac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 **(a)** Samia buys 8 kg of oranges, which cost \$1.55 per kilogram.
She pays with a \$20 note.

Calculate how much change she receives.

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

(b) \$1.55 per kilogram is \$0.05 more than the cost per kilogram last year.

Calculate the percentage increase on **last year's** cost per kilogram.

Answer(b) ..... % [2]

(c) The cost of melons is \$0.84 per kilogram.
This is an increase of 12% on last year's cost per kilogram.

Calculate last year's cost per kilogram.

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

(d) The cost of bananas is \$0.75 per kilogram.
The cost increases by 6% each year.

How many complete years will it take for the cost to become greater than \$1 per kilogram?

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

2 **(a)** Show clearly that

$$(x^2 - x + 1)(x + 1) = x^3 + 1$$

[2]

(b) Show that $x^2 - x + 1 = 0$ has no solutions.

[3]

(c) $f(x) = x^3 + 1$

(i) Find f(2).

Answer(c)(i) ..... [1]

(ii) Find f(–1).

Answer(c)(ii) ..... [1]

(iii) Find $f^{-1}(x)$.

Answer(c)(iii) $f^{-1}(x) =$ ..... [3]

(iv) Solve the equation $f^{-1}(x) = 3$.

Answer(c)(iv) $x =$ ..... [1]

3 $\mathsf{U} = \{ x \mid 0 < x \leqslant 12, x \in \mathbb{Z}\}$

A = {multiples of 3} B = {factors of 30} $C = \{x \mid 6 \leqslant x \leqslant 11, x \in \mathbb{Z}\}$

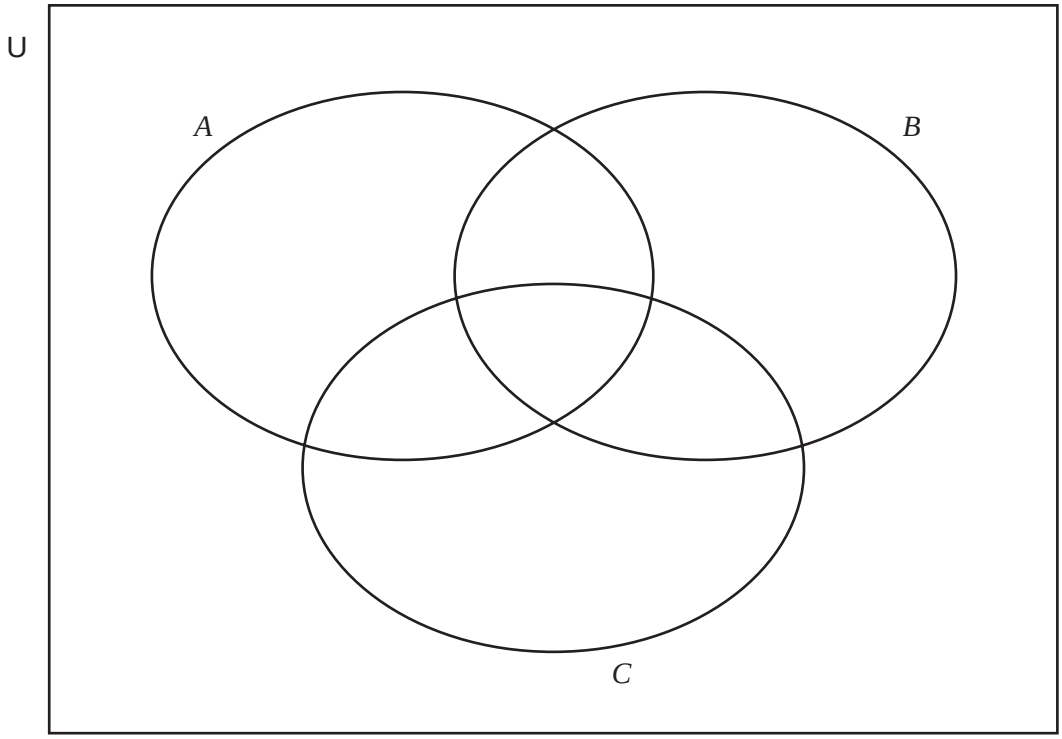
(a) List the elements of the sets.

$A = \{$ ..... $\}$

$B = \{$ ..... $\}$

$C = \{$ ..... $\}$ [3]

(b)



Put the 12 elements of U in the correct regions of the Venn diagram. [2]

(c) Complete the following statements.

(i) $A \cap B = \{$ ..... $\}$ [1]

(ii) $A \cup C = \{$ ..... $\}$ [1]

(iii) $(A \cup C) \cap B = \{$ ..... $\}$ [1]

(iv) $B' = \{$ ..... $\}$ [1]

(v) $\mathrm{n}(A \cap B \cap C)' =$ ..... [1]

4 The masses of 100 bags of flour are given in the table.

Mass (m grams)	Frequency
$980 \leqslant m < 990$	4
$990 \leqslant m < 1000$	10
$1000 \leqslant m < 1005$	50
$1005 \leqslant m < 1010$	20
$1010 \leqslant m < 1020$	8
$1020 \leqslant m < 1040$	8

(a) Calculate an estimate of the mean mass of a bag of flour, correct to the nearest gram.

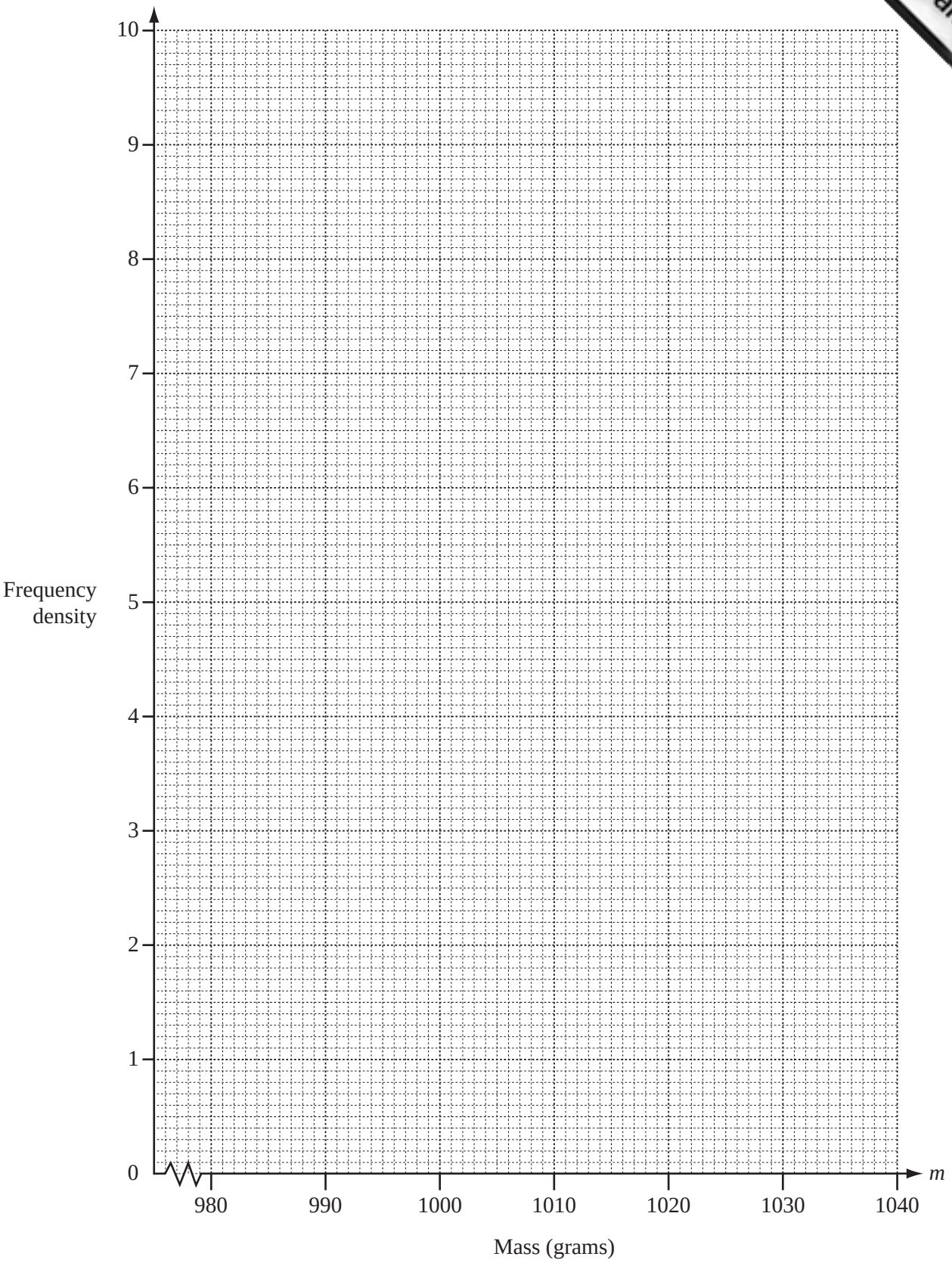
Answer(a) ..... g [3]

(b) **(i)** Complete the frequency density column in this table.

Mass (m grams)	Frequency	Frequency density
$980 \leqslant m < 990$	4	
$990 \leqslant m < 1000$	10	
$1000 \leqslant m < 1005$	50	
$1005 \leqslant m < 1010$	20	
$1010 \leqslant m < 1020$	8	
$1020 \leqslant m < 1040$	8	

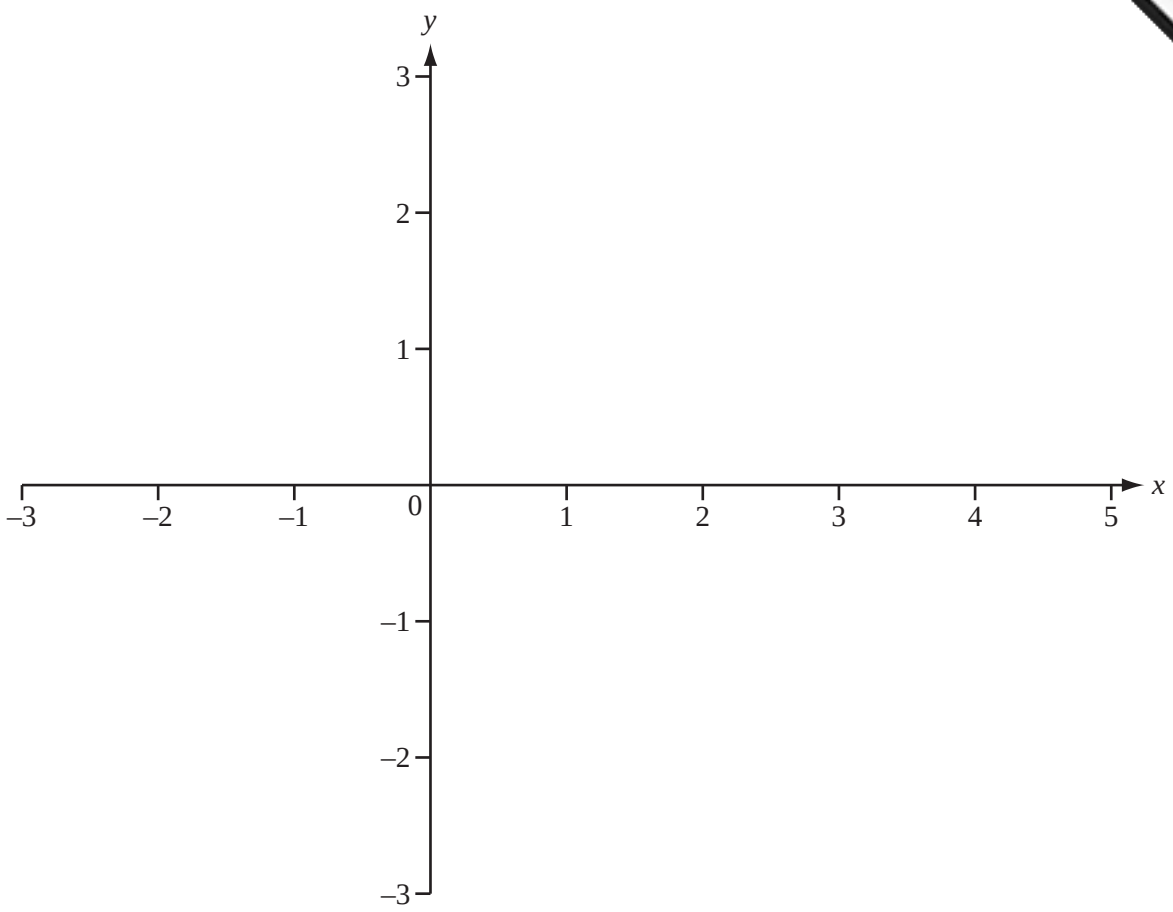
[3]

(ii) On the grid opposite, draw an accurate histogram to show this information.



[4]

5



(a) On the axes, sketch the graph of $y = f(x)$ where $f(x) = \dfrac{1}{(x^2 - 2x - 3)}$. [3]

(b) Write down the equations of the three asymptotes.

Answer(b) ..... , ... , ... [3]

(c) Write down the co-ordinates of the local maximum point.

Answer(c) (..... , ...) [2]

(d) Write down the domain and range of $f(x)$.

Answer(d) Domain .....

Range ..... [4]

(e) How many solutions are there to these equations?

(i) $f(x) = 0.5$

Answer(e)(i) ..... [1]

(ii) $|f(x)| = 0.5$

Answer(e)(ii) ..... [1]

6 **(a)** A car uses fuel at a rate of 5.6 litres per 100 km.

Calculate the distance travelled when the car has used 14 litres of fuel.

Answer(a) ..... km [2]

(b) The car passes a post at a speed of 72 km/h.

(i) Change 72 km/h into m/s.

Answer(b)(i) ..... m/s [2]

(ii) The car has a length of 4.5 metres.

Calculate, in seconds, the time the car takes to pass the post completely.

Answer(b)(ii) ..... s [2]

7 **(a)** One day Zak sold some books at \$5 each. He received a total of \$$x$.

Write down, in terms of x, the number of books he sold.

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

(b) The next day Zak reduced the price of each book to \$4.
He received \$13 more than on the first day.

(i) Write down, in terms of x, the number of books he sold on this day.

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

(ii) He sold a total of 46 books during the 2 days.

Write down an equation in x to show this information.

Answer(b)(ii) ..... [1]

(iii) Solve your equation.

Answer(b)(iii) x = ... [3]

(c) Calculate the mean price of a book during these two days.
Give your answer correct to 2 decimal places.

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

8 A student investigates the monthly rainfall (r) and the monthly temperature (t) of ten cities.

Monthly rainfall (r mm)	1	3	4	5	8	10	13	15	17	20
Monthly temperature (t° C)	2	6	9	3	11	16	15	20	25	23

(a) **Without** doing any calculations, underline the word that best describes the correlation between rainfall and temperature.

None Negative Positive [1]

(b) Find

(i) the mean rainfall,

Answer(b)(i) ..... mm [1]

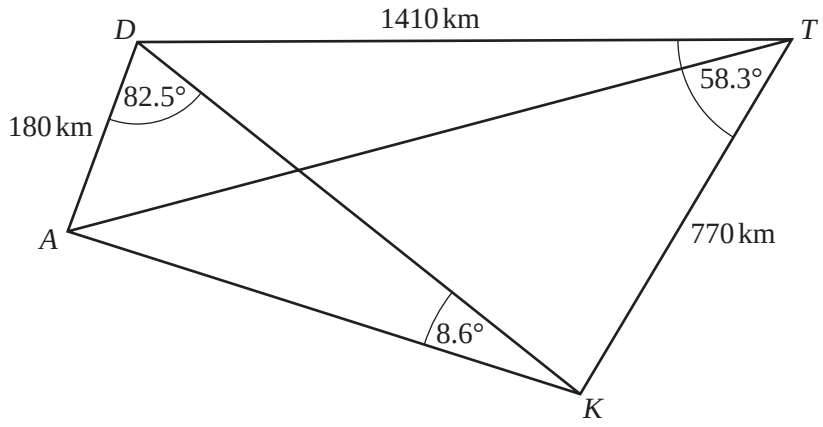
(ii) the interquartile range of the rainfall.

Answer(b)(ii) ..... mm [1]

(c) Find the equation of the linear regression line, giving t in terms of r.

Answer(c) t = ... [2]

9



NOT TO SCALE

The diagram shows the cities of Amman (*A*), Damascus (*D*), Tehran (*T*) and Kuwait (*K*).

AD =180 km, *DT* = 1410 km and *TK* = 770 km.

Angle *ADK* = 82.5°, angle *AKD* = 8.6° and angle *DTK* = 58.3°.

(a) Use the sine rule in triangle *ADK* to calculate the distance *AK*.

Answer(a) ..... km [3]

(b) Use the cosine rule in triangle *DKT* to calculate the distance *DK*.

Answer(b) ..... km [3]

(c) Calculate the area of the quadrilateral *ADTK*.

Answer(c) ..... km^2 [3]

(d) Calculate the distance *AT*.

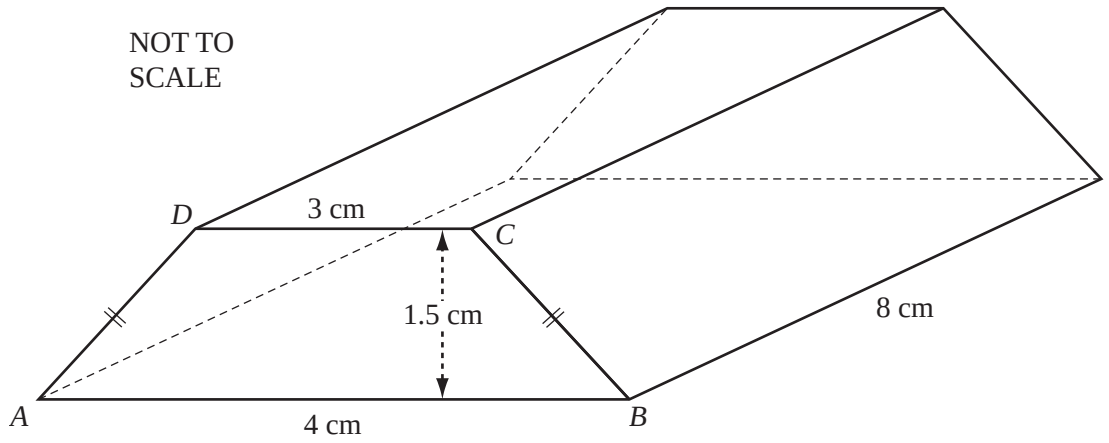
Answer(d) ..... km [5]

(e) A map is drawn to a scale of 1: 5 000 000.

Calculate the length of *DT* on the map, in centimetres.

Answer(e) ..... cm [2]

10



The diagram shows a gold bar of length 8 cm.
The cross-section of the bar, *ABCD*, is an isosceles trapezium.
AB = 4 cm, *DC* = 3 cm and these parallel edges are 1.5 cm apart.

(a) Write down the mathematical name for this solid.

.....

[1]

(b) **(i)** Calculate the area of the trapezium.

Answer(b)(i) ..... cm^2 [2]

(ii) One cubic centimetre of gold has a mass of 19.3 g.

Calculate the mass of the gold bar.

Answer(b)(ii) ..... g [3]

(iii) Calculate the **total** surface area of the gold bar.

Answer(b)(iii) ..... cm^2 [4]

(c) A box can hold a maximum of 20 kg.

Find the largest number of gold bars that can be put in the box.

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

11 A school bus picks up students at the town centre and takes them to the school.
On any day the probability that the bus is on time at the town centre is $\frac{5}{6}$.

(a) Write down the probability that the bus is not on time at the town centre.

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

(b) If the bus is on time at the town centre, the probability that it is on time at the school is $\frac{7}{8}$.
If the bus is not on time at the town centre then the probability that it is on time at the school is $\frac{1}{4}$.

(i) Draw a tree diagram and write the correct probability against each branch.

[4]

(ii) Calculate the probability that the bus is on time at the school.

Answer(b)(ii) ..... [3]

(iii) Calculate the probability that the bus is never on time at the school in a week of 5 school days.
Give your answer as a decimal, correct to 2 significant figures.

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

(iv) There are 192 days in this school's year.

On how many days is the bus expected to be on time at the school?

Answer(b)(iv) ..... [1]

12 Find the next term and the *n*th term in each of the sequences.

(a) 6, 12, 24, 48, 96, ……

Answer(a) next term = ... [1]

*n*th term = ... [2]

(b) –1, 0, 3, 8, 15, ……

Answer(b) next term = ... [1]

*n*th term = ... [3]

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