CANBERRA SECONDARY SCHOOL

1NA

2023 End-of-Year Examination

Secondary One Normal (Academic)

MATHEMATICS
Paper 1

10 October 2023
1 hour 15 minutes
0845h – 1000h

Name: _____ ( ) **Class:** _____

READ THESE INSTRUCTIONS FIRST

Write your full name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The total of the marks for this paper is 50.

The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

FOR MARKER'S USE		
	Marks Awarded	Max Marks
Total		50

Answer **all** the questions.

1 Express 420 as a product of its prime factors.

Answer ..... [1]

---

2 The product of two whole numbers is 37.

Find the sum of these two numbers.

Explain your answer.

Answer

The sum of these two numbers is ..... because .....

....

..... [2]

---

3 The numbers 350 and 540, written as the product of its prime factors are

$$350 = 2 \times 5^2 \times 7$$
$$540 = 2^2 \times 3^3 \times 5$$

Find

(a) the highest common factor of 350 and 540,

Answer ..... [1]

(b) Find the lowest common multiple of 350 and 540.

Answer ..... [1]

(c) It is given that $350n$ is a perfect square.

(i) Find the value of n.

Answer n = ... [2]

(ii) Hence find the value of $\sqrt{350n}$.

Answer ..... [2]

---

4 **Without the use of a calculator**, evaluate

(i) $4-(-6)+(-2)$

Answer ..... [2]

(ii) $(6+3)\times\sqrt{9}-6\div 3$

Answer ..... [3]

5 **(a)** Round off 1.986 to 2 decimal places.

Answer ..... [1]

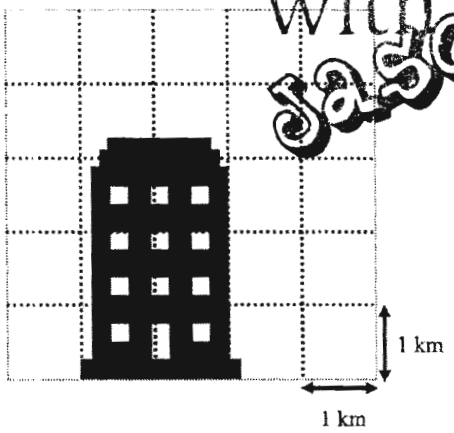
(b) By rounding off each number to 2 significant figures, estimate the sum of 23.15 and 17.83.

Answer ..... [2]

---

6 A building is shown on the map below.

Each grid on the map measures 1 km by 1 km.



Estimate the area of the building that is represented on the map.

Answer ..... km^2 [2]

7 Simplify $2x-3(2+x)$.

Answer ..... [2]

---

8 A person has m chocolate cupcakes, twice as many vanilla cupcakes than chocolate cupcakes and 16 more banana cupcakes than chocolate cupcakes.

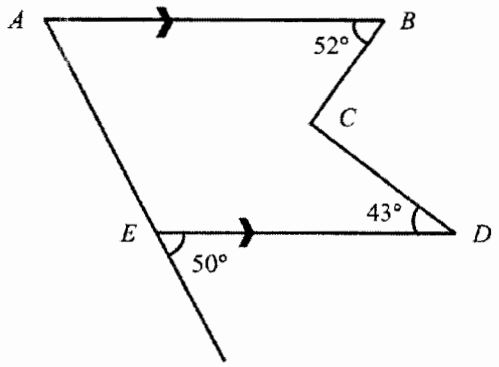
(a) Find the total number of cupcakes, leaving your answer in terms of m.

Answer ..... [2]

(b) If there are 8 chocolate cupcakes, how many banana cupcakes are there?

Answer ..... [1]

9 In the diagram below, AB is parallel to ED.



Find

(a) angle EAB,

Answer ..... [1]

(b) angle BCD.

Answer ..... [2]

10 Joey left town P for town Q at 1015, driving at an average speed of 85 km/h.

She reached town Q at 1100.

On her return journey, she drove at an average speed of 75 km/h.

Find her average speed for the entire journey.

Answer ..... km/h [4]

---

11 Express 16.2 km/h in m/s.

Answer ..... m/s [1]

12 **(a)** Express $\frac{3}{8}$ as a percentage.

Answer ..... [1]

(b) Express 121% as a decimal.

Answer ..... [1]

---

13 $-1, 2, 5, 8, \_\_\_\_\_, 14, 17$

(a) Write down the missing term in the sequence.

Answer ..... [1]

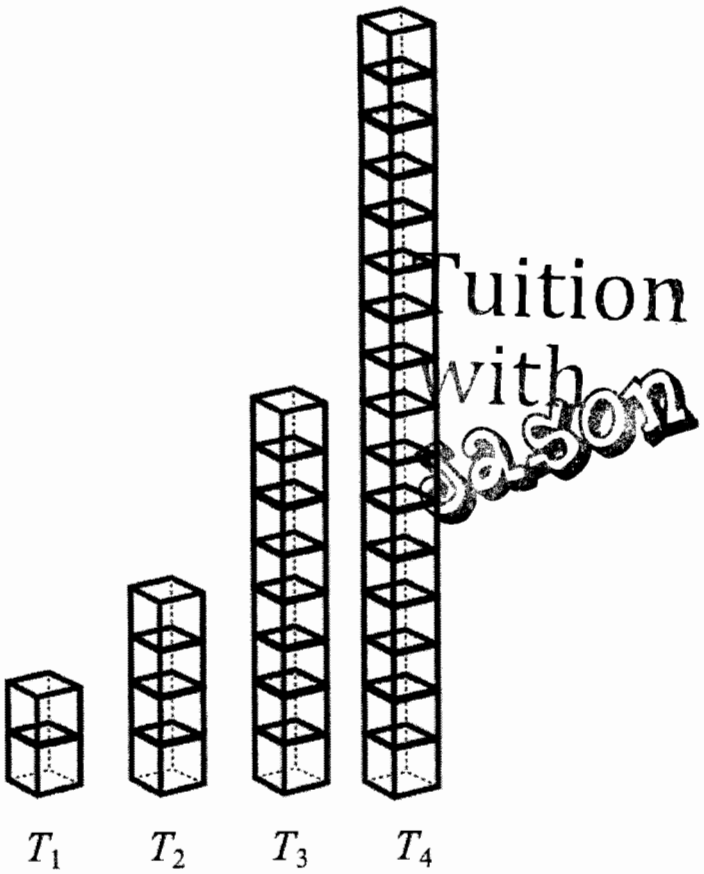
(b) By finding the general term, T_n , determine if 62 is a term in the sequence.
Explain your answer.

Answer .....

....

.... [2]

14 The diagram shows a pattern formed by building blocks.



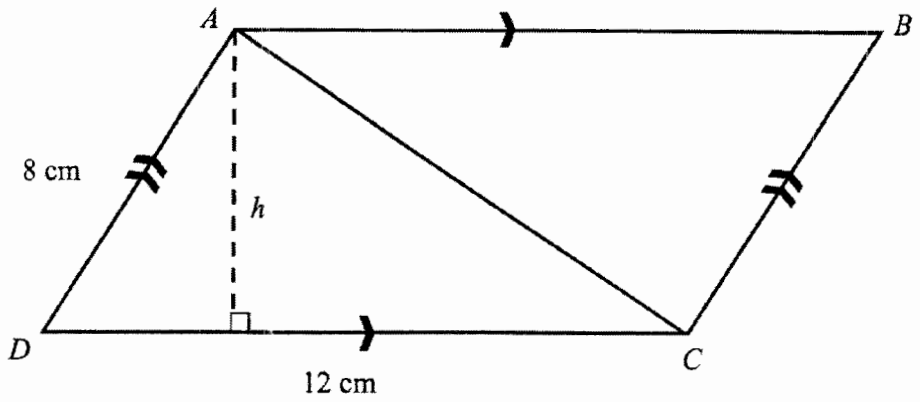
(a) Find the general term, T_n, of the sequence.

Answer ..... [1]

(b) Which term has 256 building blocks?

Answer ..... [1]

15 The diagram shows a parallelogram.



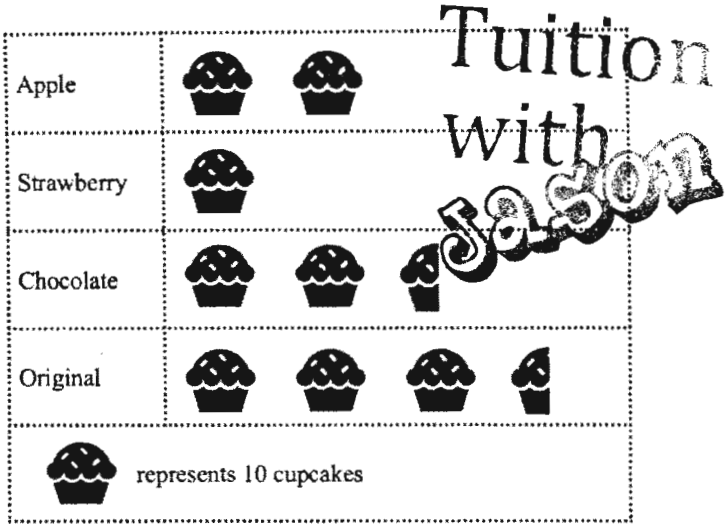
(a) Find the perimeter of the parallelogram.

Answer ..... cm [1]

(b) Given that the area of triangle ADC is 36 cm^2, find h.

Answer h = ... cm [2]

16 The pictogram shows the number of cupcakes sold.



(a) Estimate the total number of cupcakes sold.

Answer ..... [1]

(b) Why is the answer in **(a)** an estimation and not the exact number of cupcakes sold? Explain your answer.

Answer .....

.....

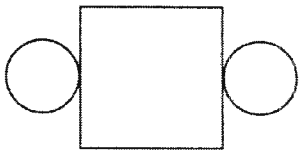
.....

.....

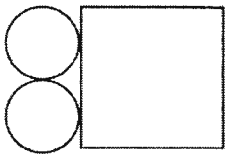
..... [2]

17 **(a)** Which of the following net is **not** a net for a cylinder?

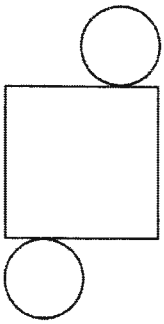
Option A



Option B

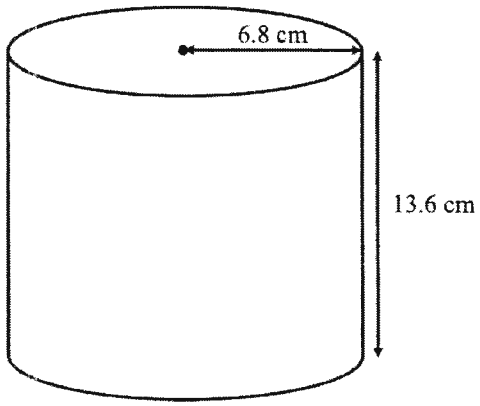


Option C



Answer Option ..... [1]

(b) The diagram below shows a closed cylinder.



Find

(i) the volume of the cylinder,

Answer ..... cm^3 [2]

(ii) the surface area of the cylinder.

Answer ..... cm^2 [2]

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MATHEMATICS
Paper 2

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1 hour 15 minutes
0950 – 1105

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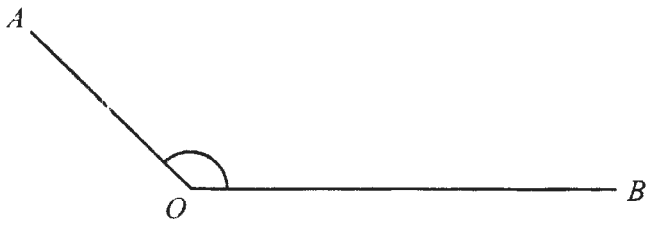
1



(a) Measure angle AOB

Answer ..... [1]

(b) Classify angle AOB as an acute, obtuse, or reflex angle.

Answer ..... [1]

---

2 The table below shows the temperature taken at 4 pm on a particular day in four cities.

City	Shanghai	Tokyo	Paris	Taipei
Temperature / °C	–5	–1	7	16

(a) Find the temperature difference between Tokyo and Taipei.

Answer ..... °C [1]

(b) Find the temperature of the 5th city, Beijing, if the temperature in Paris was exactly midway between the temperatures in Beijing and Taipei?

Answer ..... °C [1]

3 Consider the following numbers.

$$19, \quad \pi, \quad \sqrt[3]{345}, \quad -\frac{7}{9}$$

Write down

(a) an irrational number,

Answer ..... [1]

(b) an integer.

Answer ..... [1]

---

4 Write down the algebraic expression for each of the following statements.

(a) Subtract a from the cube of b.

Answer ..... [1]

(b) Divide the sum of c and 5 by d.

Answer ..... [1]

---

5 The price of rice is \$3.50/kg and the price of sugar is \$1.80/kg.

Find the total price of

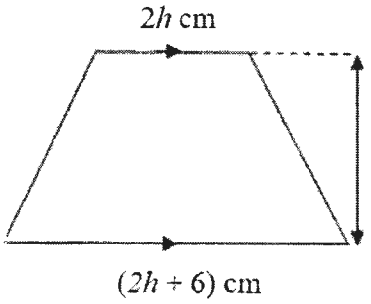
(a) 4 kg of rice and 3 kg of sugar,

Answer \$..... [1]

(b) x kg of rice and y kg of sugar, leaving your answer in terms of x and y.

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

6 A trapezium has parallel sides $2h$ cm and $(2h + 6)$ cm, with perpendicular height 7 cm.



Given that $h = 1.5$, calculate the area of the trapezium.

Answer ..... cm^2 [2]

---

7 The parking charges at Canberra Shopping Centre is as follows:

First hour	\$1.20
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(a) Calculate the parking charges if Mr Tan parks his car for 1 hour 18 minutes.

Answer \$..... [1]

(b) Mr Tan's cashcard has a value of \$3.
How long can he park his car at the shopping centre for that value?

Answer ..... hours [2]

8 In a military academy of 3600 recruits, the ratio of the number of officers to the number of recruits is 1 : 15.

(a) Find the number of officers in the academy.

Answer ..... officers [1]

(b) After some new officers joined the academy, the ratio of the number of officers to recruits becomes 4 : 45.
Find the number of new officers who joined the academy.

Answer ..... new officers [2]

---

9 Each hardcover book is twice as expensive as each paperback book.

(a) Given that each paperback book costs $\$p$, express the cost of each hardcover book in terms of p.

Answer $..... [1]

(b) Mr Raj bought two paperback books and one hardcover book for a total of \$30.
Write down an equation in terms of p, and solve it to find the cost of a paperback book.

Answer $..... [2]

10 **(a)** Solve $3(2q+5)=95$.

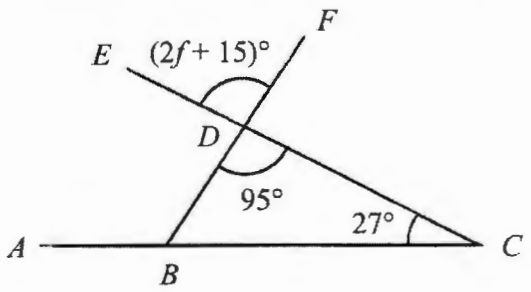
Answer $q =$ ..... [2]

(b) If $m=3n^2+2u$, find the value of m when $n=-3$ and $u=7$.

Answer $m =$ ..... [2]

---

11 ABC, CDE and BDF are straight lines.
Angle $BCD = 27°$, angle $BDC = 95°$ and angle $EDF = (2f + 15)°$.



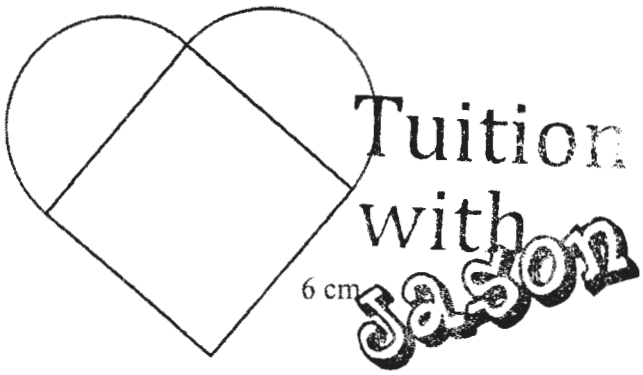
(a) Stating your reason clearly, find the size of angle ABD.

Answer angle $ABD =$ ..... (.....) [2]

(b) Calculate the value of f. Give a reason for your working.

Answer $f =$ ..... (.....) [2]

12 The figure is made up of two identical semicircles and a square.



Given that the length of each side of the square is 6 cm, find

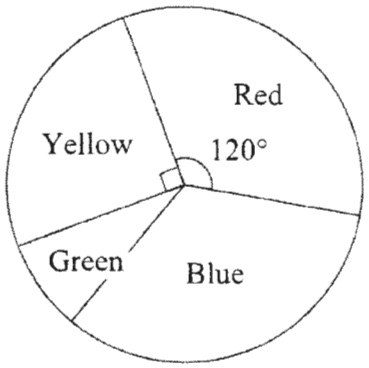
(a) the perimeter of the figure,

Answer ..... cm [2]

(b) the area of the figure.

Answer ..... cm^2 [2]

13 A group of students was asked which colour they liked best.
The results are shown in the pie chart.



(a) Calculate the percentage of students who liked Red best.

Answer .....% [1]

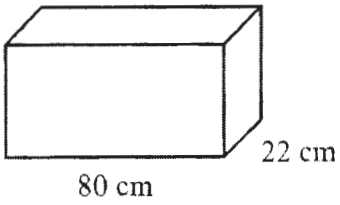
(b) Four times as many students preferred Blue to Green.
Calculate the angle of the sector which represents the number of students who liked Green best.

Answer ..... [2]

(c) Eight more students preferred Red to Yellow.
Calculate the total number of students in the group.

Answer ..... students [2]

14 A closed cuboid has length 80 cm and breadth 22 cm.
The volume of the cuboid is 110 000 cm^3.



(a) Convert 110 000 cm^3 to m^3.

Answer ..... m^3 [1]

(b) Calculate the base area of the cuboid.

Answer ..... cm^2 [1]

(c) Calculate the height of the cuboid.

Answer ..... cm [2]

(d) Calculate the total surface area of the cuboid.

Answer ..... cm^2 [2]

15 John was planning a trip to Taiwan.
He used Flightscanner to track airline ticket prices over a few months.

Month	March	April	May	June	July	August
Price / $	850	757	635	970	582	694

(a) Find the decrease in the airline ticket price from June to July as a percentage of that in June.

Answer .....% [2]

(b) John decided to purchase an airline ticket for September.
He paid $913.50 after a credit card discount of 13%.
Calculate the marked price of the airline ticket.

Answer $..... [2]

(c) John deposited 1000 TWD in a bank at Taiwan.
If the bank pays 2.5% simple interest p.a., how much will he earn in 3 years?

Answer ..... TWD [2]

End of Paper

Answers

1	$420 = 2^2 \times 3 \times 5 \times 7$	B1
2	The sum of these two numbers is **38** because 37 is a **prime number**. The **factors of 37 are 1 and 37.**	B1 B1
3a	$2 \times 5 = 10$	B1
3b	$2^2 \times 3^3 \times 5^2 \times 7 = 18900$	B1
3ci	$n = 2 \times 7$ $= 14$	M1 A1
3cii	$350n = 2^2 \times 5^2 \times 7^2$ $\sqrt{350n} = \sqrt{2^2 \times 5^2 \times 7^2}$ $= 2 \times 5 \times 7$ $= 70$	 M1 A1
4i	$4 - (-6) + (-2) = 4 + 6 - 2$ $= 8$	M1 A1
4ii	$(6 + 3) \times \sqrt{9} - 6 \div 3$ $= 9 \times 3 - 6 \div 3$ $= 27 - 2$ $= 25$	 M1 M1 A1
5a	1.99	B1
5b	$23.15 + 17.83$ $\approx 23 + 18$ $= 41$	 M1 A1
6	2 km×3 km $= 6\ km^2$	M1 A1
7	$2x - 3(2 + x)$ $= 2x - 6 - 3x$ $= -x - 6$	 M1 – expansion A1
8a	$m + 2m + m + 16$ $= 4m + 16$	M1 A1
8b	$8 + 16 = 24$	B1
9a	50°	B1
9b	$52° + 43°$ $= 95°$	M1 A1
10	Distance travelled for the entire journey $= (85 \times \frac{45}{60}) \times 2$ $= 63.75 \times 2$ $= 127.5$ km Time taken for return journey	 M1

	= 63.75 km ÷ 75 km/h $= \frac{17}{20}$ h Total time taken for entire journey $= \frac{17}{20}$ h + $\frac{45}{60}$ h = 1.6 h Average Speed = 127.5 km ÷ 1.6 h = $79\frac{11}{16}$ km/h or 79.7 km/h or 79.6875 km/h	M1 M1 A1
11	16.2 km/h $= \frac{16.2\ km}{1h}$ $= \frac{16200m}{3600s}$ = 4.5 m/s	B1
12a	$\frac{3}{8} \times 100\% = 37.5\%$	B1
12b	1.21	B1
13a	11	B1
13b	T_n = -1+3(n-1) = -1 + 3n – 3 = 3n – 4 3n – 4 = 62 3n = 66 n = 22 Since ***n* is a positive integer**, 62 is a term in the sequence.	M1 – find T_n or value of n A1
14a	$T_n = 2^n$	B1
14b	2^n = 256 n = 8 or T_8	B1
15a	40 cm	B1
15b	Area of parallelogram = 72 cm^2 h = 72 ÷ 12 = 6 cm OR	M1 A1

	$\frac{1}{2}\times 12\times h=36$ $h=\frac{36}{\frac{1}{2}\times 12}$ $=6$ cm	M1 A1
16	90	B1
16b	The size of a cupcake displayed on the pictogram is **proportional** to the number of 10 cupcakes sold. It is **difficult to determine the exact size of the cupcake** displayed on the pictogram, therefore, the answer in (a) is an estimation and not the exact number of cupcakes sold.	 B1 B1
17a	B	B1
17bi	Volume of cylinder $= \pi \times 6.8^2 \times 13.6$ $= 1980$ cm^3	 M1 A1
17bii	Total surface area = Curved surface area of cylinder + Area of 2 circles $= (2 \times \pi \times 6.8 \times 13.6) + (2 \times \pi \times 6.8^2)$ $= 872$ cm^2	 M1 A1

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MATHEMATICS
Paper 2

xx xxxxx 2023
1 hour 15 minutes
xxxx – xxxx

Name: MARKING SCHEME ( ) **Class:** _____

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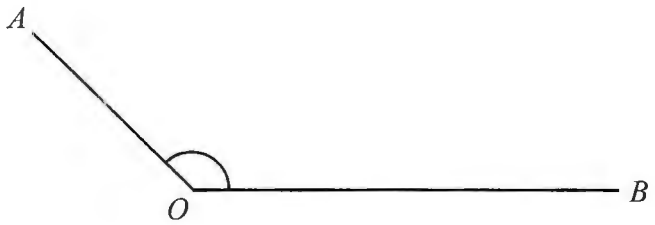
This question paper consists of 10 printed pages including the cover page.

Setter: Ms Sim Xiu Jun

Answer **all** the questions.

1



(a) Measure angle AOB.

136° [B1]

Answer ..... [1]

(b) Classify angle AOB as an acute, obtuse, or reflex angle.

Obtuse [B1]

Answer ..... [1]

---

2 The table below shows the temperature taken at 4 pm on a particular day in four cities.

City	Shanghai	Tokyo	Paris	Taipei
Temperature / °C	–5	–1	7	16

(a) Find the temperature difference between Tokyo and Taipei.

$$\text{Difference} = 16-(-1)$$
$$= 16+1$$
$$= 17\,^{\circ}\text{C}$$

17 [B1]

Answer ..... °C [1]

(b) Find the temperature of the 5th city, Beijing, if the temperature in Paris was exactly midway between the temperatures in Beijing and Taipei?

$$\text{Temperature in Beijing} = 7-(16-7)$$
$$= 7-9$$
$$= -2\,^{\circ}\text{C}$$

–2 [B1]

Answer ..... °C [1]

---

3 Consider the following numbers.

$$19, \quad \pi, \quad \sqrt[3]{345}, \quad -\frac{7}{9}$$

Write down

(a) an irrational number,

Answer π or $\sqrt[3]{345}$ [B1] ..... [1]

(b) an integer.

Answer 19 [B1] ..... [1]

---

4 Write down the algebraic expression for each of the following statements.

(a) Subtract a from the cube of b.

Answer $b^3 - a$ [B1] ..... [1]

(b) Divide the sum of c and 5 by d.

Answer $\frac{c+5}{d}$ [B1] ..... [1]

---

5 The price of rice is \$3.50/kg and the price of sugar is \$1.80/kg.

Find the total price of

(a) 4 kg of rice and 3 kg of sugar,

Total price $= 4 \times \$3.50 + 3 \times \$1.80$

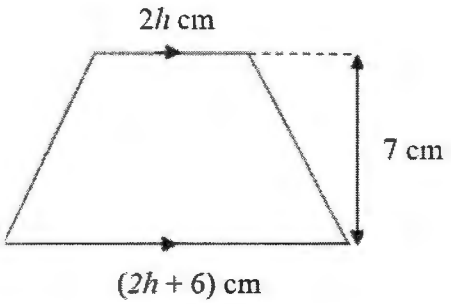
Answer \$19.40 [B1] ..... [1]

(b) x kg of rice and y kg of sugar, leaving your answer in terms of x and y.

Total price $= x \times \$3.50 + y \times \$1.80$

Answer \$($3.5x + 1.8y$) [B1] ..... [1]

6 A trapezium has parallel sides $2h$ cm and $(2h + 6)$ cm, with perpendicular height 7 cm.



Given that $h = 1.5$, calculate the area of the trapezium.

$$\text{Area of trapezium} = \frac{1}{2}\left[2(1.5)+2(1.5)+6\right](7) \quad \text{[M1]}$$

$$= 42 \text{ cm}^2$$

42 [A1]

Answer ..... cm^2 [2]

---

7 The parking charges at Canberra Shopping Centre is as follows:

First hour	\$1.20
Every subsequent half an hour or part thereof	\$0.60

(a) Calculate the parking charges if Mr Tan parks his car for 1 hour 18 minutes.

$$\text{Parking charges} = \$1.20 + \$0.60$$

$$= \$1.80$$

1.80 [B1]

Answer \$..... [1]

(b) Mr Tan's cashcard has a value of \$3.
How long can he park his car at the shopping centre for that value?

$$\text{Number of subsequent half-hours} = \frac{3-1.20}{0.60}$$

$$= 3$$

Number of hours $= 1 + 3 \times 0.5$ [M1] for 1 + 1.5 hours

$$= 2.5$$

2.5 [A1]

Answer ..... hours [2]

8 In a military academy of 3600 recruits, the ratio of the number of officers to the number of recruits is 1 : 15.

(a) Find the number of officers in the academy.

$$\text{Number of officers} = \frac{1}{15} \times 3600$$

$$= 240$$

240 [B1]

Answer ..... officers [1]

(b) After some new officers joined the academy, the ratio of the number of officers to recruits becomes 4 : 45.
Find the number of new officers who joined the academy.

$$\text{Number of officers now} = \frac{4}{45} \times 3600 \quad \text{[M1]}$$

$$= 320$$

$$\text{Number of new officers} = 320 - 240$$

$$= 80$$

80 [A1]

Answer ..... new officers [2]

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9 Each hardcover book is twice as expensive as each paperback book.

(a) Given that each paperback book costs $\$p$, express the cost of each hardcover book in terms of p.

$2p$ [B1]

Answer $..... [1]

(b) Mr Raj bought two paperback books and one hardcover book for a total of \$30. Write down an equation in terms of p, and solve it to find the cost of a paperback book.

$2p + 2p = 30$ [M1]

$4p = 30$

$p = 7.5$

7.50 [A1]

Answer $..... [2]

10 **(a)** Solve $3(2q+5)=95$.

$3(2q+5)=95$

$6q+15=95$ [M1] expansion

$6q=80$

$q=13\frac{1}{3}$

$13\frac{1}{3}$ [A1]

Answer $q=$ ..... [2]

(b) If $m=3n^2+2u$, find the value of m when $n=-3$ and $u=7$.

$m=3(-3)^2+2(7)$ [M1] substitution

$=41$

41 [A1]

Answer $m=$ ..... [2]

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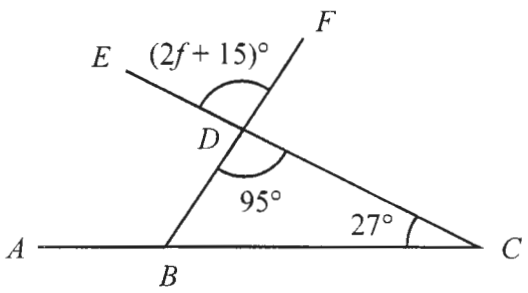
11 ABC, CDE and BDF are straight lines.
Angle $BCD = 27°$, angle $BDC = 95°$ and angle $EDF = (2f + 15)°$.



(a) Stating your reason clearly, find the size of angle ABD.

angle $ABD = 95° + 27°$

122° [B1] exterior angle of triangle [B1]

Answer angle $ABD =$ ..... (.....) [2]

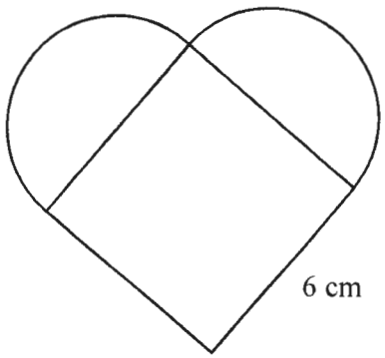
(b) Calculate the value of f. Give a reason for your working.

$(2f + 15)° = 95°$

40 [B1] vertically opposite angles [B1]

Answer $f =$ ..... (.....) [2]

12 The figure is made up of two identical semicircles and a square.



Given that the length of each side of the square is 6 cm, find

(a) the perimeter of the figure,

Perimeter $= 2\pi(3) + 2(6)$ [M1] for $2\pi(3)$

$= 30.8$ cm (3 s. f.)

30.8 [A1]

Answer ..... cm [2]

(b) the area of the figure.

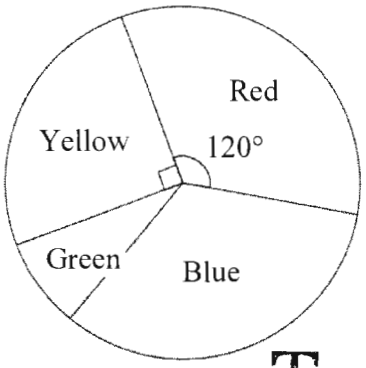
Area $= \pi(3)^2 + (6)^2$ [M1]

$= 64.3$ cm^2 (3 s. f.)

64.3 [A1]

Answer ..... cm^2 [2]

13 A group of students was asked which colour they liked best.
The results are shown in the pie chart.



(a) Calculate the percentage of students who liked Red best.

$$\text{Percentage of students} = \frac{120^\circ}{360^\circ} \times 100\%$$

$$= 33.3\% \quad or \quad 33\frac{1}{3}\%$$

$33\frac{1}{3}$ [B1]

Answer .....% [1]

(b) Four times as many students preferred Blue to Green.
Calculate the angle of the sector which represents the number of students who liked Green best.

$$\text{Angle of Green sector} = \frac{360^\circ - 120^\circ - 90^\circ}{1+4} \qquad [M1]$$

$$= \frac{150^\circ}{5}$$

$$= 30^\circ$$

30° [A1]

Answer ..... [2]

(c) Eight more students preferred Red to Yellow.
Calculate the total number of students in the group.

$$\text{Total number of students} = \frac{360^\circ}{120^\circ - 90^\circ} \times 8 \qquad [M1]$$

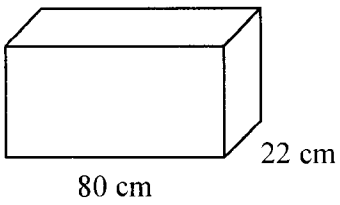
$$= 12 \times 8$$

$$= 96$$

96 [A1]

Answer ..... students [2]

14 A closed cuboid has length 80 cm and breadth 22 cm.
The volume of the cuboid is 110 000 cm^3.



(a) Convert 110 000 cm^3 to m^3.

$110\ 000\ cm^3 = 110\ 000 \div 100^3$

$= 0.11\ m^3$

Answer 0.11 [B1] ..... m^3 [1]

(b) Calculate the base area of the cuboid.

Base area $= 80 \times 22$

$= 1760\ cm^2$

Answer 1760 [B1] ..... cm^2 [1]

(c) Calculate the height of the cuboid.

$\text{Height} = \frac{110\ 000}{1760}$ [M1]

$= 62.5\ cm$

Answer 62.5 [A1] ..... cm [2]

(d) Calculate the total surface area of the cuboid.

Total surface area

$= 2(80 \times 62.5 + 62.5 \times 22 + 22 \times 80)$ [M1]

$= 16\ 270\ cm^2$

Answer 16 270 [A1] ..... cm^2 [2]

15 John was planning a trip to Taiwan.
He used Flightscanner to track airline ticket prices over a few months.

Month	March	April	May	June	July	August
Price / $	850	757	635	970	582	694

(a) Find the decrease in the airline ticket price from June to July as a percentage of that in June.

$$\text{Percentage} = \frac{970 - 582}{970} \times 100\% \qquad \text{[M1] for \$388 decrease}$$

$$= 40\%$$

Answer 40 [A1] % [2]

(b) John decided to purchase an airline ticket for September.
He paid \$913.50 after a credit card discount of 13%.
Calculate the marked price of the airline ticket.

$$\text{Marked price} = \frac{100}{87} \times \$913.50 \qquad \text{[M1]}$$

$$= \$1050$$

Answer \$ 1050 [A1] [2]

(c) John deposited 1000 TWD in a bank at Taiwan.
If the bank pays 2.5% simple interest p.a., how much will he earn in 3 years?

$$\text{Interest} = 1000 \times \frac{2.5}{100} \times 3 \qquad \text{[M1]}$$

$$= 75 \text{ TWD}$$

Answer 75 [A1] TWD [2]

End of Paper