Class	Register Number	Name

BARTLEY SECONDARY SCHOOL

END-OF-YEAR EXAMINATION

MATHEMATICS

Sec 1 Normal (Academic)

Paper 1 — 9 October 2023

1 h 45 mins

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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

Answer **all** questions.
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 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.

The number of marks is given in the brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 70.

For Examiner's Use
70

This document consists of **16** printed pages.

Set by: David Chua

[Turn over]

Answer **all** questions.

1 Evaluate $\frac{3.846^2}{5.2+2.8}$.

Give your answer to

(a) 2 decimal places,

Answer ..... [1]

(b) 4 significant figures.

Answer ..... [1]

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2 Express $\frac{18}{11}$ as a recurring decimal.

Answer ..... [1]

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3 Express 35% as a fraction.

Answer ..... [1]

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4 $-1.3 \quad \pi \quad 5 \quad \frac{\sqrt{10}}{3} \quad 2\frac{3}{4} \quad -4.6$

(a) From the above list, write down the

(i) irrational number(s),

Answer ..... [1]

(ii) prime number(s).

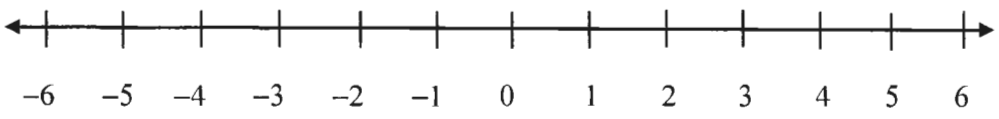
Answer ..... [1]

(b) From the above list, write the numbers in descending order, starting with the biggest.

Answer ..... , ... , ... , ... , ... , ... [2]
biggest smallest

(c) From the above list, represent the numbers on the number line below.

Answer



[2]

5 Written as a product of its prime factors, $252 = 2^2 \times 3^2 \times 7$.

(a) Express 360 as a product of its prime factors.

Answer ..... [1]

(b) Find the lowest common multiple of 252 and 360.

Answer ..... [1]

(c) Find the smallest positive integer value of k such that $252k$ is a perfect cube.

Answer ..... [1]

6 200 lollipops, 280 bars of chocolate and 320 sweets are to be packed into party bags.
The number of lollipops, bars of chocolates and sweets are distributed equally across all bags.

(a) Find the greatest number of bags that can be packed.

Answer ..... [2]

(b) Calculate the number of sweets in each party bag.

Answer ..... [1]

---

7 Simplify

(a) $4p-\frac{1}{2}p+2p$,

Answer ..... [1]

(b) $9f-2(3-2f)$.

Answer ..... [2]

---

8 $W = m^2 - 3pq$

Find the value of W when $m = -2$, $p = -5$ and $q = 3$.

Answer $W =$ ..... [2]

---

9 Solve

(a) $\frac{x}{2} = 3,$

Answer $x =$ ..... [1]

(b) $3(y-2) = 5y - 1.$

Answer $y =$ ..... [2]

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10 Lynn sold x burgers.
She sold twice as many sandwiches as burgers.
She sold 4 more egg tarts than burgers.

(a) Write an algebraic expression in terms of x for

(i) the number of sandwiches sold,

Answer ..... [1]

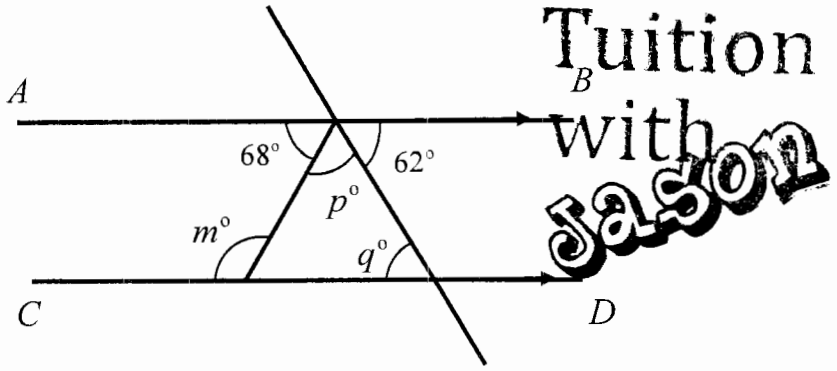
(ii) the number of egg tarts sold.

Answer ..... [1]

(b) Lynn sold 364 items in total.
Form an equation and find the number of burgers sold.

Answer ..... [2]

11



AB is parallel to *CD*.
Find angle *m*, *p* and *q*.
Give a reason for finding each angle.

Answer

m = ...° because.....

p = ...° because.....

q = ...° because.....[3]

12

Brand of Ice Cream	Sugar content (g)	Number of servings
Jem & Berry	158	12
Hatten Dust	106	8

The table shows the sugar content in grams and the corresponding number of servings of two different brands of ice cream.

Determine which brand of ice cream has a higher proportion of sugar per serving.
Show your working clearly.

Explain your answer.

Answer

.....

..... [2]

---

13 An investor purchased a watch for $8400.
Three years later, the watch was sold at $9114.
Calculate the percentage of profit made from the sale of the watch.

Answer .....% [2]

---

14 Aaron and Brian shared $3600.
The ratio of Aaron's share to Brian's share is 4 : 5.

Find Brian's share.

Answer $ ..... [2]

---

15 Shaun participated in a mini Biathlon.
He cycled at a speed of 20 km/h for 45 minutes, then ran 12 km at the speed of 16 km/h.

(a) Find the distance he cycled.

Answer ..... km [2]

(b) Find the time taken for the run.

Answer ..... h [2]

(c) Calculate Shaun's average speed in the Biathlon.

Answer ..... km/h [2]

16

1st 2nd 3rd 4th

The diagram shows a series of patterns formed using dots.

(a) How many dots would there be in the 5th pattern?

Answer ..... dots [1]

(b) Write down, in terms of n, a formula for the number of dots in the nth pattern.

Answer ..... [1]

(c) Find the number of dots in the 20th pattern.

Answer ..... dots [1]

(d) Mandee claims that one of the patterns contains 255 dots.

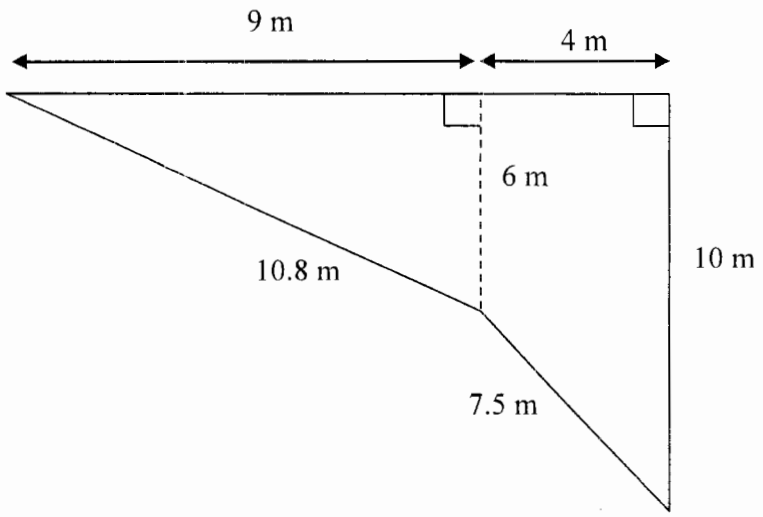
Do you agree? Explain.
Show all workings clearly.

Answer

.....

..... [2]

17



The figure shows the shape of a park.
It is made up of a trapezium and a triangle.

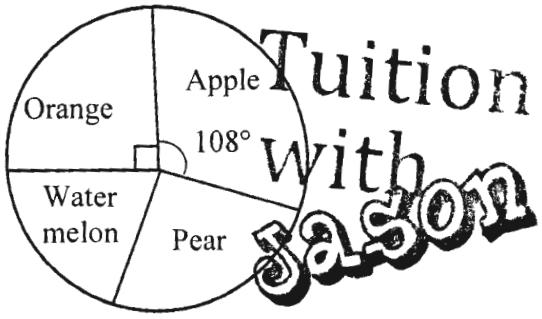
(a) Find the perimeter of the park.

Answer ..... m [1]

(b) Calculate the area of the park.

Answer ..... m^2 [3]

18



The pie chart represents the favourite fruit of some students.
60 students chose orange as their favourite fruit.

(a) Find the total number of students who took part in the survey.

Answer ..... [2]

(b) Calculate the percentage of students who chose apple.

Answer ..... % [2]

(c) Given that 5% of the entire school population chose orange as their favourite fruit in the survey, find the entire school population.

Answer ..... [2]

19 At the 2023 ATAS Travel Fair, Ho Say travel agency offers the following tour packages.

Tour Package	9 Days Family Fun in France	10 Days Charm of Hokkaido	15 Days Relax in Korea and Jeju
Cost Per Person	$3000 nett	$2500 nett	$2739 (excluding 8% GST)
Special Offer	Free 15 inches Samsu luggage bag	50% off second person	$100 discount per person (after GST)

Tom wants to bring his mother on a holiday.

(a) Calculate the amount of money that Tom would save if he brings his mother for the 10 Days Charm of Hokkaido instead of the 9 Day Family Fun in France.

Answer $ ..... [3]

(b) Calculate the cost per person **including GST** for the 15 Days Relax in Korea and Jeju Tour Package.

Answer $ ..... [2]

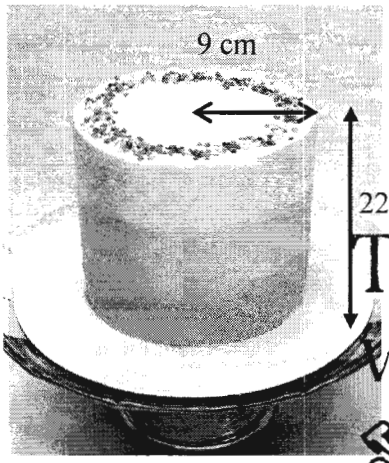
(c) Tom has a budget of $5000 to spend for the holiday.
Which tour package should he decide on.
Show working to support your answer.

Answer

He should decide on ..... because .....

..... [2]

20



The diagram shows a cylindrical cake.
The cake has a radius of 9 cm and a height of 22.5 cm.

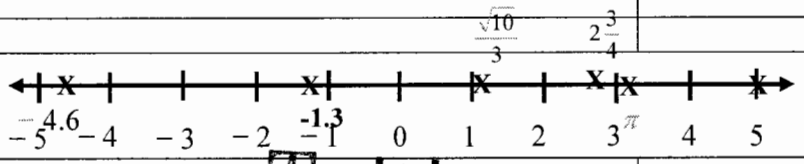
(a) Calculate the volume of the cake.

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

(b) Fondant is used to coat the outer surface of the cake.
Calculate the total surface area of the cake that is coated with fondant.

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

END OF PAPER

Question			Working	Answer	Marks	Remarks
1	(a)		$\frac{3.846^2}{5.2+2.8} = 1.84896$	1.85 (2 dp)	B1	
	(b)			1.849 (4 sf)	B1	
2			$\frac{18}{11} = 1.636363$	$1.\dot{6}\dot{3}$	B1	
3			$35\% = \frac{35}{100}$ $= \frac{7}{20}$	$\frac{7}{20}$ or $\frac{35}{100}$	B1	
4	(a)	(i)	Irrational number $= \frac{\sqrt{10}}{3}, \pi$		B1	Both answer correct 1 mark
		(ii)	Prime number = 5		B1	
	(b)		$5, \pi, 2\frac{3}{4}, \frac{\sqrt{10}}{3}, -1.3, -4.6$ (Descending Order)		B2	B2 – all correct B1 – any 3 correct
	(c)			B2	Any 3 correct, 1 mark
5	(a)		$360 = 2^3 \times 3^2 \times 5$		B1	
	(b)		$LCM = 2^3 \times 3^2 \times 5 \times 7$ $= 2520$	2520	B1	
	(c)		$k = 2 \times 3 \times 7^2$ $= 294$	294	B1	

Question			Working	Answer	Marks	Remarks
6	(a)		$\begin{array}{r\|l} 2 & 200,\ 280,\ 320 \\ 2 & 100,\ 140,\ 160 \\ 2 & 50,\ 70,\ 80 \\ 5 & 25,\ 35,\ 40 \\ & 5,\ 7,\ 8 \end{array}$		M1	
			$HCF = 2^3 \times 5$ $= 40$ *Greatest no of bags* $= 40$		A1	
	(b)		No of sweets in each party bag $= \frac{320}{40}$ $= 8$ *sweets*		B1	
7	(a)		$4p - \frac{1}{2}p + 2p = 5\frac{1}{2}p$	$5\frac{1}{2}p$ or $\frac{11}{2}p$	B1	
	(b)		$9f - 2(3 - 2f) = 9f - 6 + 4f$ $= 13f - 6$		M1 A1	
8			$W = m^2 - 3pq$ $= (-2)^2 - 3(-5)(3)$ $= 4 + 45$ $= 49$	22	M1 A1	Correct sub
9	(a)		$\frac{x}{2} = 3$ $x = 3 \times 2$ $= 6$	$y = 6$	B1	
	(b)		$3(y - 2) = 5y - 1$ $3y - 6 = 5y - 1$ $-6 + 1 = 2y$ $-5 = 2y$ $-\frac{5}{2} = y$ $-2\frac{1}{2} = y$	$-5 = 2y$ $y = -\frac{5}{2}$ *or* $-2\frac{1}{2}$	M1 A1	

Question			Working	Answer	Marks	Remarks
10	(a)	(i)	$2x$ sandwiches	$2x$	B1	
	(a)	(ii)	$(x+4)$ *egg tarts*	$x+4$	B1	
	(b)		$x+2x+x+4=364$ $4x+4=364$ $4x=360$ $x=90$ No of burgers sold = 90	90	M1 A1	
11			$\angle m=180^0-68^0$ (interior angle) $=112^0$ $\angle p=180^0-68^0-62^0$ (angles on a straight line) $=50^0$ $\angle q=62^0$ (alternate angle)		B1 B1 B1	If at least 1 angle properties is wrong or not stated, minus 1m for the whole question.
12			Brand Jem and Berry $1\ serving=\frac{158}{12}$ $=13.17\,g\,(sugar)$ Brand Hatten Dust $1\ serving=\frac{106}{8}$ $=13.25\,g\,(sugar)$ Brand Hatten Dust has higher sugar content per serving.		M1 A1	Comparison of same quantity Accept comparison of other quantities Conclusion
13			Profit = \$9114 – \$8400 = \$714 Percentage profit $=\frac{714}{8400}\times100$ $=8.5\%$	or $=\frac{9114}{8400}\times100$ $=108.5\%$ $\%\,Profit=108.5\%-100\%$ $=8.5\%$	M1 A1	

Question			Working	Answer	Marks	Remarks
14			$Brian\ share = \frac{5}{9} \times \$3600$ $= \$2000$	$9\ units = \$3600$ $5\ units = \frac{\$3600}{9} \times 5$ $(Brian's\ share) = \$2000$	M1 A1	
15	(a)		$Distance\ cycled = 20\ km/h \times \frac{45}{60}\ h$ $= 15\ km$		M1 A1	
	(b)		$Time\ taken\ for\ run = \frac{12\,km}{16\,km/h}$ $= \frac{3}{4}\ h$		M1 A1	
	(c)		$Average\ Speed = \frac{Total\ distance}{Total\ time}$ $= \frac{(15+12)\,km}{(\frac{45}{60}+\frac{3}{4})\,h}$ $= \frac{27\,km}{1.5\,h}$ $= 18\,km/h$		M1 A1	
16	(a)		25 dots		B1	
	(b)		$T_n = n^2$ or $n \times n$		B1	
	(c)		$T_n = n^2$ $T_{20} = 20^2$ $= 400\ dots$	400 dots	B1	ECF
	(d)		$n^2 = 255$ $n = \sqrt{255}$ $= 15.97$ It is not possible because n is **not a positive integer.**		M1 A1	ECF

Question			Working	Answer	Marks	Remarks
17	(a)		Perimeter of park = 9 + 4 + 10 + 7.5 + 10.8 = 41.3 m		B1	
	(b)		Area of the park = $(\frac{1}{2} \times 6 \times 9) + \frac{1}{2}(6+10)(4)$ = 59 m^2	M1 – Area of Triangle M1 – Area of Trapezium	M1 M1 A1	
18	(a)		90^o = 60 (orange) 360^o = 60 x 4 = 240 students		M1 A1	
	(b)		$Percentage = \frac{108}{360} \times 100\%$ $= 30\%$		M1 A1	
	(c)		5% = 60 *students* 100% = 60 × 20 = 1200 *students*		M1 A1	
19	(a)		Total cost for France = $2 \times 3000 = 6000$ Total cost for Hokkaido = $\frac{50}{100} \times 2500 + 2500 = \$3750$ Savings = $6000 - 3750 = 2250$	M1- France M1 – Hokkaido A1		
	(b)		$Cost\ per\ person = \frac{108}{100} \times 2739$ (*before discount*) = \$2958.12 $Cost\ per\ person = \$2958.12 - \$100$ = \$2858.12	M1 A1		

Question			Working	Answer	Marks	Remarks
	(c)		Total cost for Korea $2\times(\$2958.12-100)=\$5716.24$ Since only **Hokkaido is less than $5000**, Marcus will choose the **10 Days Charm of Hokkaido.**	M1 – Cost for Korea A1 – Explanation + choice (ft)		ECF Deduct 1 mark if answer is rounded off.
20	(a)		$Volume=3.142\times9^2\times22.5$ $=5726.295\ cm^3$ or $Volume=\pi\times9^2\times22.5$ $=5725.5526\ cm^3$ $=5730\ cm^3$		M1 A1 or M1 A1	
	(b)		$Total\ Surface\ Area=2\times3.142\times9\times22.5+3.142\times9^2$ $=1527.012\ cm^2$ or $Total\ Surface\ Area=2\times\pi\times9\times22.5+\pi\times9^2$ $=1526.8140\ cm^2$ $=1530\ cm^2$	M1 – curved surface area, M1 - top circle M1 – curved surface area, M1 - top circle	M2 A1 or M2 A1	