

Name	SOLUTION	()	Class	
------	-----------------	-----	-------	--



南 华 中 学

NAN HUA HIGH SCHOOL

PRELIMINARY EXAMINATION 2023

Subject : Mathematics
Paper : 4052/01
Level : Secondary Four Express
Date : 17 August 2023
Duration : 2 hours 15 min

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class 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.

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 90.

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 Examiner's Use
U		
P		
A		

This paper consists of 286 printed pages and 2 blank pages.

Compound interest

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

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

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

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

2023 Prelim Exam Math Paper 1 - MARKING SCHEME

Nan Hua High School
Preliminary Examination 2023

Mathematics 4052/01

Answer **all** questions.

1 $3^x = 3^{11} + 3^{11} + 3^{11}$

Find the value of x .

$$\begin{aligned} 3^x &= 3^{11} + 3^{11} + 3^{11} \\ &= 3(3^{11}) \\ &= 3^{1+11} \\ &= 3^{12} \\ \therefore x &= 12 \end{aligned}$$

Answer $x = \dots\dots\dots$ [1]

- 2 Charles invested with a bank that pays interest of 3.5% per annum compounded half-yearly.

He received \$3500 as interest at the end of 3 years.

Find the original amount that Charles invested.

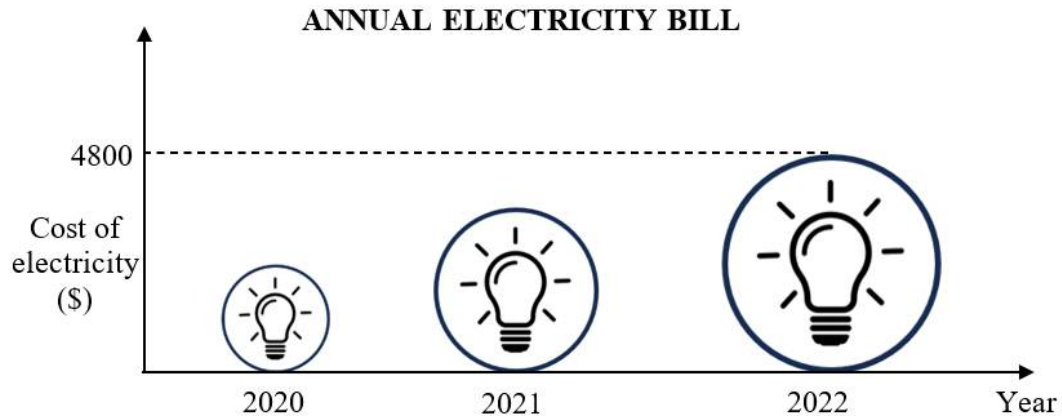
Give your answer to the nearest dollar.

Let P be the original amount.

$$\begin{aligned} 3500 + P &= P \left(1 + \frac{3.5}{200} \right)^6 \\ &= 1.0175^6 P \\ 1.0175^6 P - P &= 3500 \\ P(1.0175^6 - 1) &= 3500 \\ P &= \frac{3500}{1.0175^6 - 1} \\ &= 31905 \end{aligned}$$

Answer \$ $\dots\dots\dots$ [2]

- 3 Ken draws this graph to show his annual electricity cost for his 5-room flat for year 2020, 2021 and 2022.



State one aspect of the graph that may be misleading and explain how this may lead to a misinterpretation of the graph.

Answer

Comparing scale

The vertical axis is not labelled at the start **OR** Start value not indicated on the vertical axis.

It is not possible to determine the exact costs for the three years or that it is not possible to find the increase in costs as it is not possible to compare the years without a scale.

OR

Comparing height or area

It is not clear as to whether the height of the lightbulb or the area of the circle should be used to determine the annual electricity bill. Or

The size of the picture not only increases with height, but also in the width.

When using area, the cost looks 4 times more in 2022 as compared to 2020. If using the height of the lightbulbs, the cost in 2022 looks twice as much in 2020.

[2]

- 4 The marked price of a 65-inch Ultra HD 4K TV is \$6000.
Mr Lim buys the TV on hire purchase scheme with down payment of 20% on the marked price.
He then pays monthly instalments over 4 years at a simple interest rate of 1.37% per annum.
Calculate the total amount that Mr Lim pays for the television.

$$\begin{aligned}\text{Interest} &= \frac{4800 \times 1.37 \times 4}{100} \\ &= \$263.04 \\ \text{Total amount} &= 263.04 + 6000 \\ &= \$6263.04\end{aligned}$$

Answer \$ [2]

- 5 The table shows the time, to the nearest hours, taken by 12 students to complete a project.

Time t (hours)	Frequency
$30 \leq t < 35$	1
$35 \leq t < 40$	2
$40 \leq t < 45$	5
$45 \leq t < 50$	4

- (a) Calculate an estimate for the mean time taken.

$$\begin{aligned}\text{Mean time} &= \frac{1 \times 32.5 + 2 \times 37.5 + 5 \times 42.5 + 4 \times 47.5}{12} \\ &= \frac{510}{12} \\ &= 42.5 \text{ hours}\end{aligned}$$

Answer hours [1]

- (b) Calculate an estimate for the standard deviation of the time taken.

$$\begin{aligned}\text{Standard deviation} &= \sqrt{\frac{1 \times 32.5^2 + 2 \times 37.5^2 + 5 \times 42.5^2 + 4 \times 47.5^2}{12} - \left(\frac{510}{12}\right)^2} \\ &= 4.5644 \\ &= 4.56 \text{ hours (3 s.f.)}\end{aligned}$$

Answer hours [1]

6 The average mass of haemoglobin in a red blood cell is about 31 picograms.

(a) Express 31 picograms in grams, giving your answer in standard form.

[1 picogram = 10^{-12} grams]

$$31 \text{ picograms} = 31 \times 10^{-12} \text{ grams}$$

$$= 3.1 \times 10^{-11} \text{ grams}$$

Answer g [1]

(b) There are 5×10^6 red blood cells in 1 cubic millimetre of blood.

Calculate the mass, in grams, of haemoglobin in 1 cubic millimetre of blood.

Give your answer in standard form.

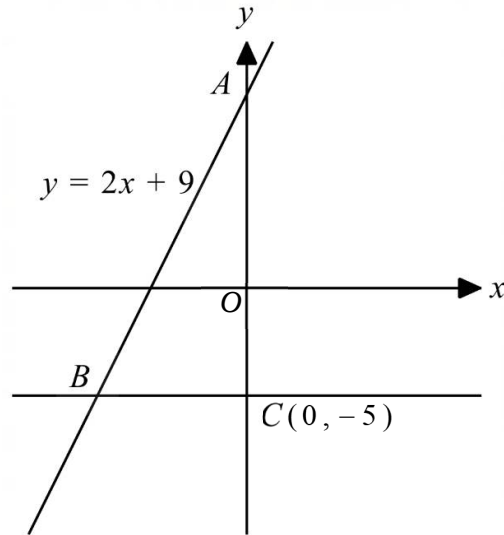
$$\text{Average amount} = 3.1 \times 10^{-11} \times 5 \times 10^6$$

$$= 15.5 \times 10^{-5}$$

$$= 1.55 \times 10^{-4} \text{ g}$$

Answer g [1]

- 7 In the diagram, C is the point $(0, -5)$ and A is a point on the y -axis.
The line AB meets the horizontal line through C at point B .
The equation of line AB is $y = 2x + 9$.



- (a) State the equation of the line parallel to line AB , passing through $(0, 7)$.

$$y = 2x + 7$$

Answer [1]

- (b) Find the coordinates of point A and point B .

Coordinates of $A = (0, 9)$.

When $y = -5$,

$$-5 = 2x + 9$$

$$2x = -14$$

$$x = -7$$

Coordinates of $B = (-7, -5)$.

Answer A (.....,)

B (.....,) [2]

- 8 The ratio of the number of employees in company P to that in company Q was 3: 4.
8 employees left company Q to join company P .
The number of employees in company P now is 4 more than company Q .
Find the original number of employees in company P .

Let the number of employees in P be $3x$

Let the number of employees in Q be $4x$

$$3x + 8 = (4x - 8) + 4$$

$$x = 12$$

Original number in $P = 36$

Alternative solution:

Let no of employees in each company be P and Q

Ratio of $Q : P = 4 : 3$

$$Q = \frac{4}{3}P$$

$$P + 8 = (Q - 8) + 4$$

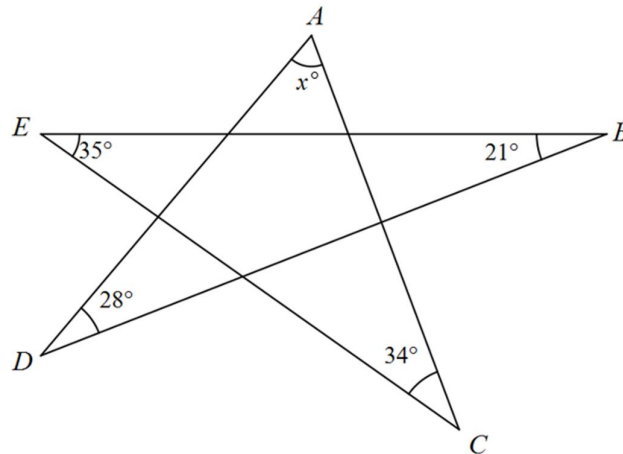
$$P + 8 = \frac{4}{3}P - 8 + 4$$

$$\frac{P}{3} = 12$$

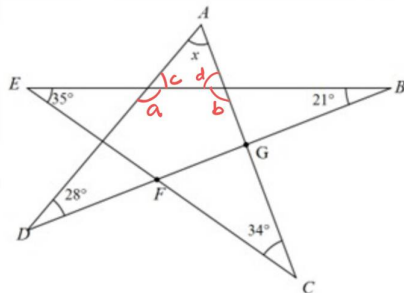
$$P = 36$$

Answer [3]

9



Straight lines AC, AD, BE, BD, CE intersect to form the figure in the diagram.
Find the value of x .



$$\begin{aligned}\angle GFC &= 35^\circ + 21^\circ (\text{Exterior } \angle \text{ of } \Delta) \\ &= 56^\circ\end{aligned}$$

$$\angle FGC = x^\circ + 28^\circ (\text{Exterior } \angle \text{ of } \Delta)$$

$$x^\circ + 28^\circ + 56^\circ + 34^\circ = 180^\circ (\angle \text{ sum of } \Delta)$$

$$x = 62$$

Alternative:

$$\begin{aligned}\angle a &= 180^\circ - 28^\circ - 21^\circ (\angle \text{ sum of } \Delta) \\ &= 131^\circ\end{aligned}$$

$$\begin{aligned}\angle c &= 180^\circ - 131^\circ (\text{adjacent } \angle \text{ on a straight line}) \\ &= 49^\circ\end{aligned}$$

$$\begin{aligned}\angle b &= 180^\circ - 35^\circ - 34^\circ (\angle \text{ sum of } \Delta) \\ &= 111^\circ\end{aligned}$$

$$\begin{aligned}\angle d &= 180^\circ - 111^\circ (\text{adjacent } \angle \text{ on a straight line}) \\ &= 69^\circ\end{aligned}$$

$$\begin{aligned}x^\circ &= 180^\circ - 69^\circ - 49^\circ (\angle \text{ sum of } \Delta) \\ &= 62^\circ\end{aligned}$$

Answer $x = \dots\dots\dots$ [2]

- 10 (a)** Factorise completely $3fg + 1 - g - 3f$.

$$\begin{aligned}3fg + 1 - g - 3f &= 3fg - g + 1 - 3f \\&= g(3f - 1) + (1 - 3f) \\&= g(3f - 1) - (3f - 1) \\&= (g - 1)(3f - 1)\end{aligned}$$

Answer [2]

- (b)** Factorise completely $44 - 11k^2$.

$$\begin{aligned}44 - 11k^2 &= 11(4 - k^2) \\&= 11(2 - k)(2 + k)\end{aligned}$$

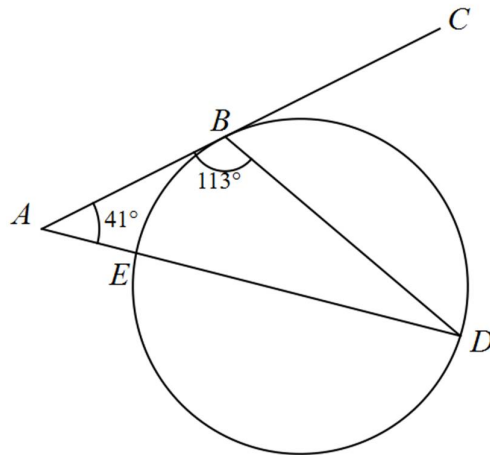
Answer [2]

- 11** Make x the subject of the formula $w = \frac{2x + y}{3x - y}$.

$$\begin{aligned}w &= \frac{2x + y}{3x - y} \\w(3x - y) &= 2x + y \\3wx - wy &= 2x + y \\3wx - 2x &= y + wy \\x(3w - 2) &= y(1 + w) \\x &= \frac{y(1 + w)}{3w - 2} \quad \text{or} \quad \frac{y + wy}{3w - 2}\end{aligned}$$

Answer [3]

12



In the diagram, ABC is a tangent to the circle.
The line AD cuts the circle at E .
Angle $BAD = 41^\circ$ and angle $ABD = 113^\circ$.

Explain why ED is not a diameter of the circle.
Give reasons for each step of your working.

$$\angle BDA$$

$$= 180^\circ - 113^\circ - 41^\circ \text{ (}\angle \text{ sum of } \Delta \text{)}$$

$$= 26^\circ$$

If ED is the diameter, and centre of circle is O ,
then $\angle ABO = 90^\circ$ (tangent $\perp$ radius)

$$\angle OBD$$

$$= 113^\circ - 90^\circ$$

$$= 23^\circ$$

Since $\angle BDA \neq \angle OBD$, $OB \neq OD$

O does not lie on ED and hence ED is not diameter.

Alternative:

$$\angle ODB = 180^\circ - 41^\circ - 113^\circ \text{ (}\angle \text{ sum of } \Delta \text{)}$$

$$= 26^\circ$$

$$= \angle OBD \text{ (base } \angle \text{ of isosceles } \Delta \text{)}$$

$$\angle OBA = 113^\circ - 26^\circ$$

$$= 87^\circ$$

$$\neq 90^\circ$$

O does not lie on ED and hence ED is not diameter.

[3]

13 Written as the product of its prime factors, $8316 = 2^2 \times 3^3 \times 7 \times 11$.

(a) Express 840 as the product of its prime factors.

$$840 = 2^3 \times 3 \times 5 \times 7$$

Answer 840 = [1]

(b) (i) Hence write down the LCM of 8316 and 840, giving your answers as the product of its prime factors.

LCM of 8316 and 840

$$= 2^3 \times 3^3 \times 5 \times 7 \times 11$$

Answer LCM = [1]

(ii) Hence write down the greatest integer that will divide 8316 and 840 exactly.

the greatest integer that will divide 8316

$$\text{and 840 exactly} = 2^2 \times 3 \times 7 = 84$$

Answer [1]

14 $\vec{PQ} = \begin{pmatrix} 6 \\ -8 \end{pmatrix}$.

(a) Find $|\vec{PQ}|$.

$$|\vec{PQ}| = \sqrt{6^2 + (-8)^2}$$

$$= 10 \text{ units}$$

Answer $|\vec{PQ}| = \dots\dots\dots$ [1]

(b) R is the point (2, -9).

$$\vec{SR} = 2\vec{PQ}.$$

Find the coordinates of S.

$$\vec{SR} = 2\vec{PQ}$$

$$\vec{OR} - \vec{OS} = 2\vec{PQ}$$

$$\begin{pmatrix} 2 \\ -9 \end{pmatrix} - \vec{OS} = 2\begin{pmatrix} 6 \\ -8 \end{pmatrix}$$

$$\vec{OS} = \begin{pmatrix} 2 \\ -9 \end{pmatrix} - 2\begin{pmatrix} 6 \\ -8 \end{pmatrix}$$

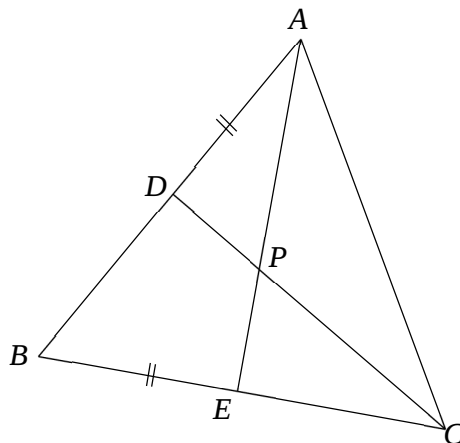
$$= \begin{pmatrix} -10 \\ 7 \end{pmatrix}$$

Coordinates of S = (-10, 7).

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

Note: minus 1 from question for not using vector presentation throughout

- 15 The diagram shows an equilateral triangle ABC .
 D and E are points on AB and BC respectively such that $AD = BE$.
 AE meets CD at P .



Show that triangle ABE is congruent to triangle CAD .
Give a reason for each statement you make.

$$BE = AD \quad (\text{given})$$

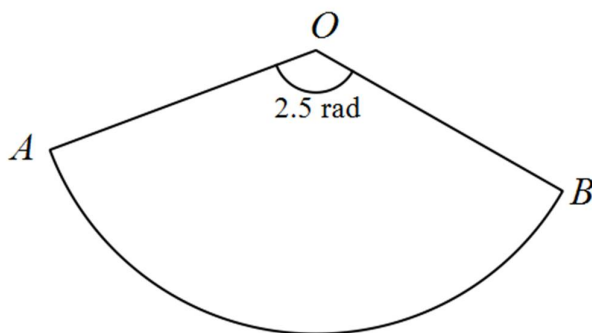
$$AB = AC \quad (\text{sides of equilateral } \Delta\text{s})$$

$$\angle ABE = \angle CAD = 60^\circ \quad (\text{interior } \angle\text{s of equilateral } \Delta\text{s})$$

$$\therefore \triangle ABE \equiv \triangle CAD \quad (\text{SAS})$$

[3]

16



The diagram shows the sector of a circle, AOB .

The perimeter of sector is 81 cm and angle AOB is 2.5 radian.

- (a) Find the radius of the sector.

Let radius of the sector be r cm.

$$r + r + 2.5r = 81$$

$$r = 18 \text{ cm}$$

Answer cm [2]

- (b) The sides, OA and OB , are joined to form a cone.

Find the radius of the cone.

Let the radius of the base of the cone
be s cm

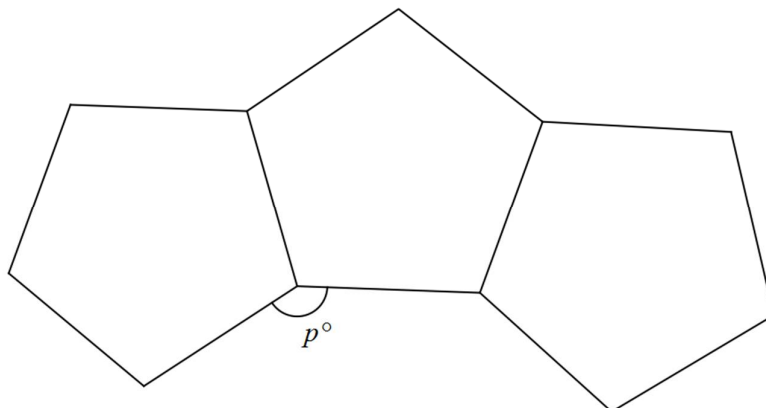
$$2\pi s = 2.5(18)$$

$$s = 7.1620$$

$$= 7.16 \text{ cm (3 s.f.)}$$

Answer cm [2]

17



The diagram shows three regular pentagons joined together on its edges.

(a) Find the value of p .

$$\begin{aligned}\text{Size of interior angle} &= \frac{3 \times 180^\circ}{5} \\ &= 108^\circ\end{aligned}$$

$$\begin{aligned}p &= 360 - 2(108) \\ &= 144\end{aligned}$$

Answer $p = \dots\dots\dots$ [2]

(b) Additional regular pentagons are added to these 3 pentagons to form a closed ring. Find the total number of pentagons that are used to form this ring.

$$\begin{aligned}\frac{(n-2)180}{n} &= 144 \\ 180n - 360 &= 144n \\ 36n &= 360 \\ n &= 10\end{aligned}$$

Alternative Solution:

$$\begin{aligned}\text{Ext } \angle &= 180^\circ - 144^\circ \\ &= 36^\circ \\ 36n &= 360 \\ n &= 10\end{aligned}$$

Answer $\dots\dots\dots$ [2]

- 18** In a sequence, the same number is subtracted each time to obtain the next term.
The first five terms of the sequence are

$$68 \quad a \quad b \quad c \quad 24.$$

- (a)** Find the values of a , b and c .

$$68 + 4d = 24$$

$$4d = 24 - 68$$

$$d = -11$$

$$a = 57, b = 46, c = 35$$

$$\text{Answer } a = \dots\dots\dots$$

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

$$c = \dots\dots\dots [2]$$

- (b)** Write down an expression for the n th term of this sequence.

$$68 + (n-1)(-11)$$

$$= 79 - 11n \text{ or } 68 - 11(n-1)$$

$$\text{Answer } \dots\dots\dots [1]$$

- (c)** Explain why -524 is not a term of this sequence.

$$79 - 11n = -524$$

$$-11n = -603$$

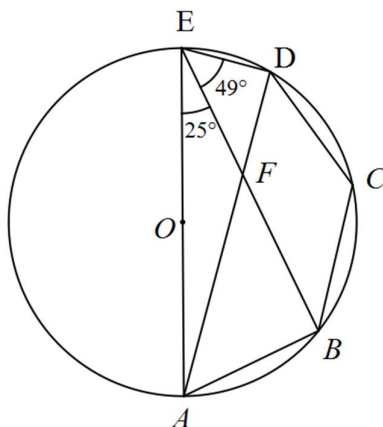
$$n = 54.8$$

Since n has to be a positive integer, then

-524 is not a term of this sequence

[1]

19



O is the centre of the circle passing through A, B, C, D and E .
Chords BE and AD cuts at F .

Angle $AEB = 25^\circ$ and angle $BED = 49^\circ$.

- (a) Show that triangle ABF is similar to triangle EDF .
Give a reason for each statement you make.

Answer

$\angle FDE = \angle FBA = 90^\circ$ ($\angle$ in a semi-circle /
 $\angle$ s in the same segment)

$\angle EFD = \angle AFB$ (Vertically opposite $\angle$ s)

$\angle BAF = \angle DEF = 49^\circ$ ($\angle$ s in the same segment)

$\triangle ABF$ is similar to $\triangle EDF$ (AA similarity)

[2]

- (b) Find angle BCD .
Give a reason for each step of your answer.

$\angle BCD = 180^\circ - 49^\circ$ ($\angle$ s in opposite segment)
 $= 131^\circ$

Answer

[2]

20 $\mathcal{C} = \{x \text{ is an integer: } 1 \leq x \leq 15\}$

$F = \{\text{prime numbers}\}$

$G = \{x : 5 < x \leq 12\}$

(a) List the elements in F .

$F = \{2, 3, 5, 7, 11, 13\}$

Answer [1]

(b) State the value of $n(G)$.

$G = \{6, 7, 8, 9, 10, 11, 12\}$

$n(G) = 7$

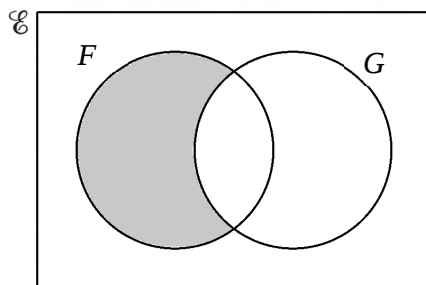
Answer [1]

(c) List all the elements in $(F \cup G)'$.

$(F \cup G)' = \{1, 4, 14, 15\}$

Answer [1]

(d) On the Venn diagram, shade the region which represents $F \cap G'$.



[1]

- 21 The ratio of surface area of 2 similar solid spheres is 4: 9.
The radius of the smaller sphere is 6 cm.

(a) Find the radius of the larger sphere.

$$\begin{aligned}\left(\frac{r}{6}\right)^2 &= \frac{9}{4} \\ r^2 &= \frac{9}{4} \times 36 \\ r &= 9\end{aligned}$$

Answercm [1]

(b) Express the total the volume of the 2 solid spheres in terms of π .

$$\begin{aligned}\text{Vol} &= \frac{4}{3}\pi(6)^3 + \frac{4}{3}\pi(9)^3 \\ &= 1260\pi\end{aligned}$$

Answercm³ [2]

- (c) The spheres are melted and recast into 2 solid cones, A and B.
The radius and height of cone A is 6 cm and 10 cm respectively.
The radius of cone B is 12 cm.
Showing your working clearly, explain if the 2 cones are similar.

Answer

$$\begin{aligned}\text{Volume of cone A} &= \frac{1}{3}\pi(6)^2(10) \\ &= 120\pi\end{aligned}$$

$$\begin{aligned}\text{Volume of cone B} &= 1260\pi - 120\pi \\ &= 1140\pi\end{aligned}$$

$$\begin{aligned}\text{Ratio of radius} &= \frac{6}{12} \\ &= \frac{1}{2}\end{aligned}$$

$$\begin{aligned}\text{Ratio of volume} &= \frac{120\pi}{1140\pi} \\ &= \frac{2}{19} \\ &\neq \left(\frac{1}{2}\right)^3\end{aligned}$$

Since ratio of volume not equal to ratio of the cube of corresponding sides, the cones are not similar.

Alternative:

Let height of cone B be h .

$$\frac{1}{3}\pi(6)^2(10) + \frac{1}{3}\pi(12)^2(h) = 1260\pi$$

$$120 + 48h = 1260$$

$$h = 23.75$$

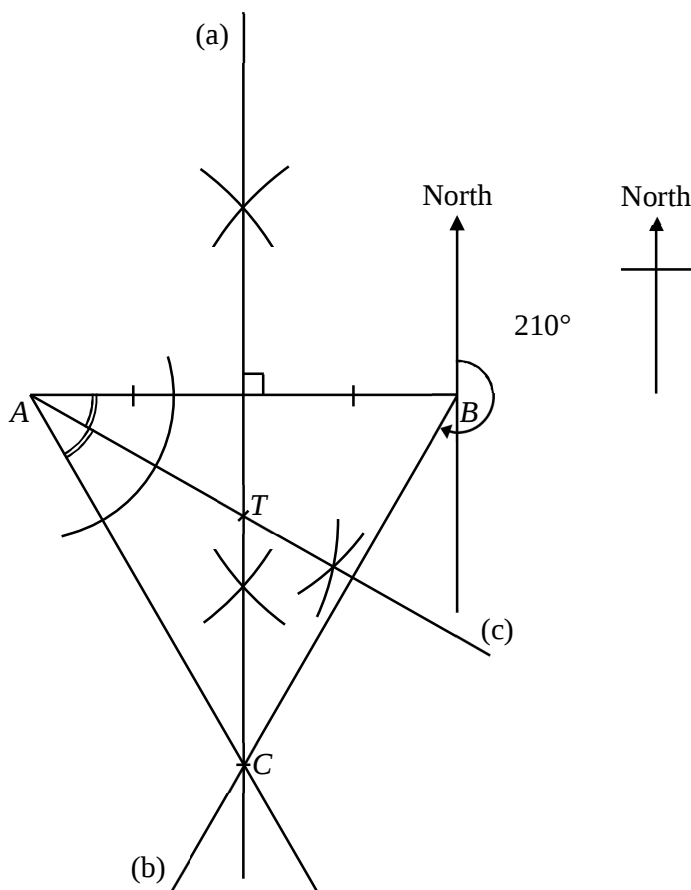
$$\begin{aligned}\text{Ratio of radius} &= \frac{6}{12} \\ &= \frac{1}{2}\end{aligned}$$

$$\begin{aligned}\text{Ratio of height} &= \frac{10}{23.75} \\ &\neq \frac{1}{2}\end{aligned}$$

Since ratio of corresponding sides are not equal, the cones are not similar.

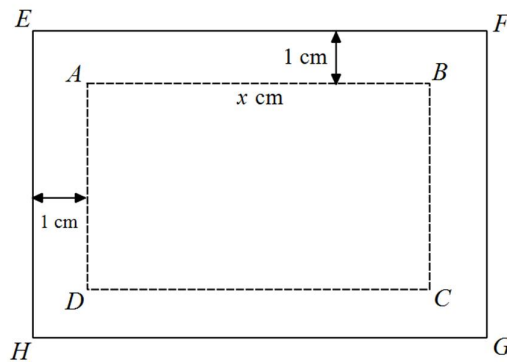
[2]

- 22 The diagram shows the location of 2 towns, A and B.



- (a) Construct the perpendicular bisector of AB . [1]
- (b) Another new town, C , is to be built on a bearing of 210° from town B . It is equidistant from town A and town B . Mark the position of town C . [2]
- (c) Construct the angle bisector of angle BAC . [1]
- (d) A telecommunication tower, T , serving the 3 towns is to be built so that it is equidistant from AB and AC , and equidistant from town A and B . Mark the position of T . [1]

23



The diagram shows a photograph, $ABCD$, length x cm and perimeter 40 cm.
It is mounted on a piece of rectangular cardboard, $EFGH$.
There is a uniform border of 1 cm width around the photograph.

- (a) The area of the rectangular cardboard, $EFGH$, is S cm². [3]
Show that it can be expressed as $S = -x^2 + 20x + 44$.

Breadth of photo

$$= \frac{40 - 2x}{2}$$

$$= 20 - x$$

$$S = (x + 2)(20 - x + 2)$$

$$= (x + 2)(22 - x)$$

$$= 22x - x^2 - 2x + 44$$

$$= -x^2 + 20x + 44$$

- (b) Jane claims that the area of the rectangular cardboard, S , can be greater than 150 cm². [2]
Explain if the claim is correct.

$$S = -x^2 + 20x + 44$$

$$= -(x^2 - 20x) + 44$$

$$= -(x - 10)^2 + 44 + 100$$

$$= -(x - 10)^2 + 144$$

For all values of x ,

$$(x - 10)^2 \geq 0$$

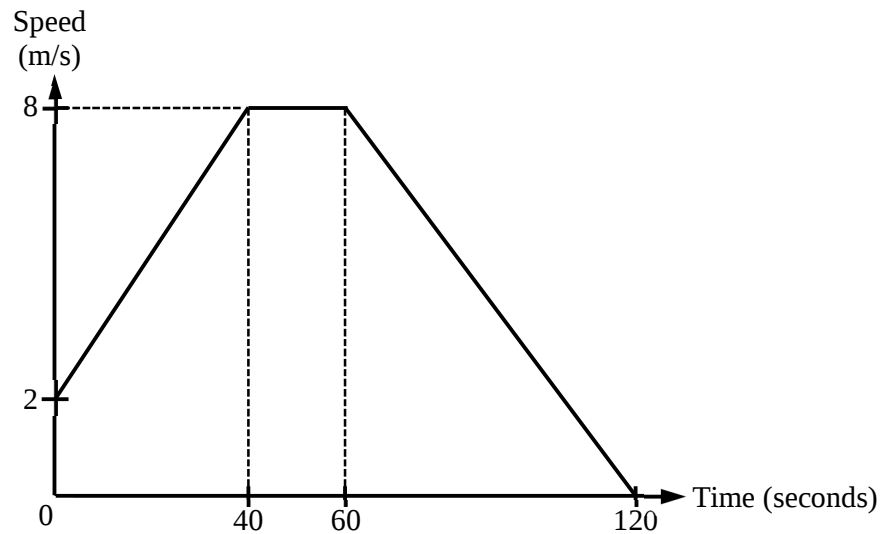
$$-(x - 10)^2 \leq 0$$

$$-(x - 10)^2 + 144 \leq 144$$

$$S \leq 144$$

Hence Jane is wrong.

- 24 The diagram shows the speed-time graph of a cyclist after passing a fixed point A.



- (a) Calculate the acceleration of the cyclist during the first 10 seconds after passing point A.

Acceleration

$$= \frac{8-2}{40}$$

$$= 0.15 \text{ m/s}^2$$

Answer Acceleration = m/s^2 [1]

- (b) Calculate the average speed, in m/s , of the cyclist in the last 80 seconds.

Distance travelled in the last 80s

$$= \frac{1}{2}(80+20)(8)$$

$$= 400 \text{ m}$$

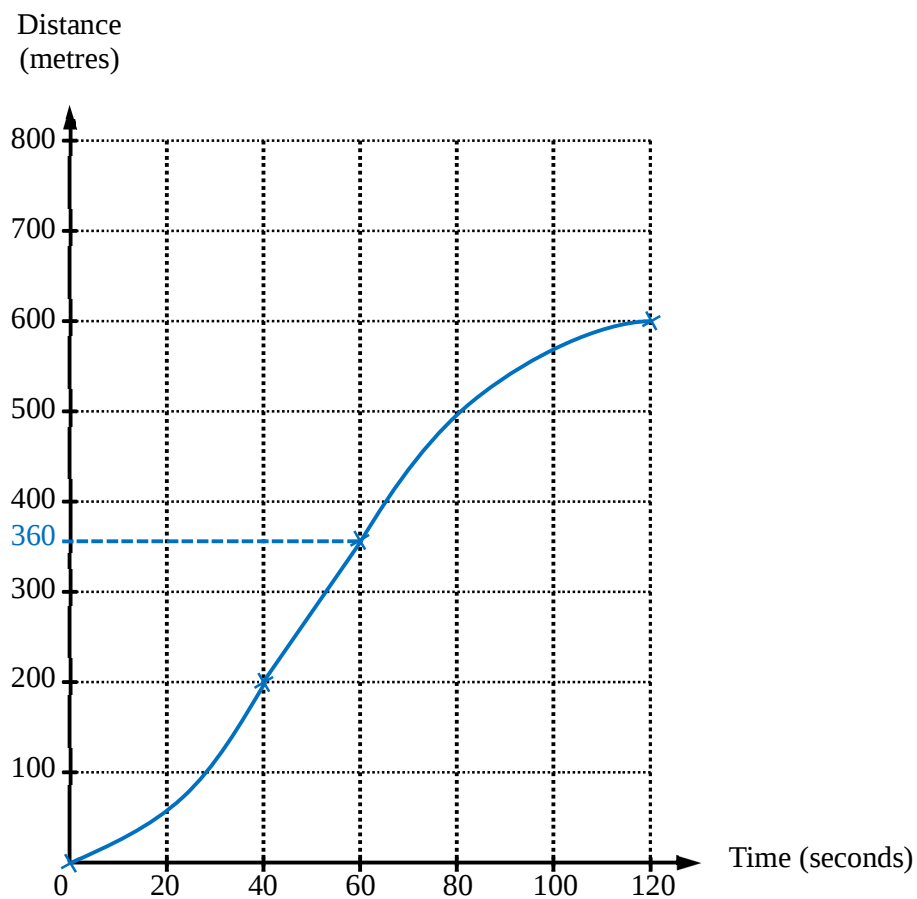
Average speed in last 80s

$$= \frac{400}{80}$$

$$= 5 \text{ m/s}$$

Answer Average speed = m/s [2]

- (c) On the grid below, sketch the distance-time graph for the journey.



- 25 (a) The table shows the choice of CCA for Secondary One students in a school.

	Sports	Clubs and Society	Performing Arts	Total
Males	70	26	72	168
Females	38	a	c	d
Total	108	b	141	316

- (a) Find the values of a , b , c and d in the table.

$$a = 41$$

$$b = 67$$

$$c = 69$$

$$d = 148$$

$$\text{Answer } a = \dots\dots\dots$$

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

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

$$d = \dots\dots\dots [2]$$

- (b) A pie chart is to be drawn showing the data for **males**.
Calculate the angle representing the males who choose Sports.

$$\frac{70}{168} \times 360^\circ = 150^\circ$$

$$\text{Answer } \dots\dots\dots [1]$$

- (c) In which group, males or females, did a greater percentage choose Performing Arts.
Explain.

Performing Arts:

Percentage of males

$$= \frac{72}{168} \times 100\%$$

$$= 42.857\%$$

Percentage of females

$$= \frac{69}{148} \times 100\%$$

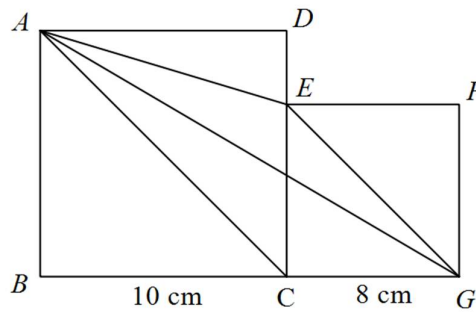
$$= 46.6\%$$

Since $46.6\% > 42.857\%$

Females have a greater proportion

[2]

26



The diagram shows two squares, $ABCD$ and $CGFE$, of lengths 10 cm and 8 cm respectively.

(a) Find the length of AG .

$$\begin{aligned} AG &= \sqrt{18^2 + 10^2} \\ &= \sqrt{424} \\ &= 20.6 \text{ cm} \end{aligned}$$

Answer cm [1]

(b) Show that AC is parallel to EG .

Give a reason for each statement you make.

[2]

Answer

Angles ACB and angle $EGC = 45^\circ$ since diagonals of squares bisect the interior angles.

Since Angles $ACB = \text{angle } EGC$, corresponding angles, $AC \parallel EG$

Alternative:

Angles $ACB = \text{angle } CEG$ (prove by alternate angles)

(c) Find the area of triangle AGE .

$$\begin{aligned} \angle AGB &= \tan^{-1} \frac{10}{18} \\ &= 29.054^\circ \\ EG &= \sqrt{8^2 + 8^2} \\ &= \sqrt{128} \\ \angle AGE &= 45^\circ - 29.054^\circ \\ &= 15.947^\circ \end{aligned}$$

$$\begin{aligned}\text{Area} &= \frac{1}{2}(\sqrt{128})(\sqrt{424})\sin 15.947^\circ \\ &= 32.004 \\ &= 32.0 \text{ cm}^2\end{aligned}$$

Alternative Solution

Answer cm² [3]

----- End of Paper -----