GREENRIDGE SECONDARY SCHOOL
2024 PRELIMINARY EXAMINATION
SECONDARY 4 NORMAL (ACADEMIC)

CANDIDATE NAME	
CLASS	-
INDEX NUMBER	

MATHEMATICS SYLLABUS A 4045/01

Paper 1 5 August 2024

Setter: Mrs Goh-Kok Mei Leng 2 hours

Candidates answer on the Question Paper.

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your class, index 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.

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 70.

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	
Total	/70

[Turn over

Mathematical Formulae

Compound interest

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

Mensuration

Curved surface area of a cone = πrl

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

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

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

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

Arc length = $r\theta$, where θ 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

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

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

Answer **all** the questions.

1 It is given that $m = \dfrac{78.9}{\sqrt{24.05 - 7.85}}$.

(a) Without the use of a calculator, estimate the value of m. Show your working clearly.

Answer ……...…… [1]

(b) Use your calculator to find the value of m, leaving your answer to 2 decimal places.

Answer ……...…… [1]

---

2 The weight of a golf ball is 0.0459368 kg.

(a) Write this weight correct to 3 significant figures.

Answer ……...…… [1]

(b) Write your answer in part **(a)** in standard form.

Answer ……...…… [1]

---

3 Find the least integer value of x satisfying $5x > -21$.

Answer ……...…… [2]

---

4 3, 8, 13, 18, 23, …

(a) Find an algebraic expression for the nth term in the sequence.

Answer ……...…… [1]

(b) Show that 403 is a term in the sequence.

Answer

[2]

---

5 **(a)** Find the obtuse angle of A such that $\sin A° = 0.8667$.

Answer A = ……...……..…….. [1]

(b) Write the following in order of size, starting with the smallest.

32.5% 0.3255 $0.3\dot{2}$ $\sqrt{\frac{64}{625}}$

Answer ……, ...……...… ,.. ……, …… [2]
smallest

---

6 **(a)** Write $\frac{5^4 \times 5^2}{\sqrt{5}}$ as a single power of 5.

Answer ……...…… [2]

(b) Given that $\frac{1}{32} = 2^m$, find the value of *m*.

Answer *m* = ……...…… [1]

---

7 Factorise

(a) $2ap - 6bp + aq - 3bq$,

Answer ……...……..... [2]

(b) $2x^2 + x - 10$.

Answer ……...……..... [1]

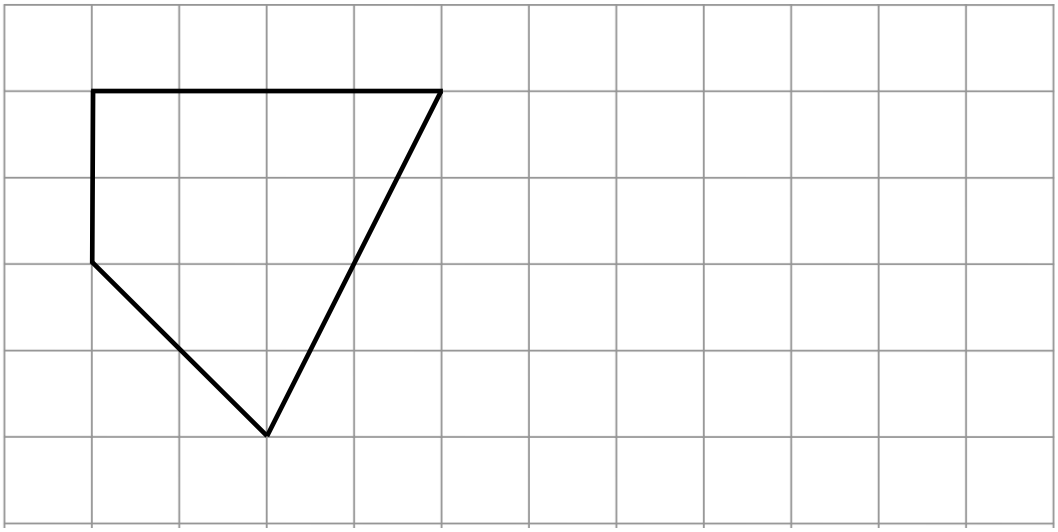
---

8 In a sale, the price of a watch was reduced by 30% of its original price to $385.
Find the original price of the watch.

Answer $ ……...……..… [2]

---

9 Draw a reduction of this quadrilateral using the scale factor of $\frac{1}{2}$.



[2]

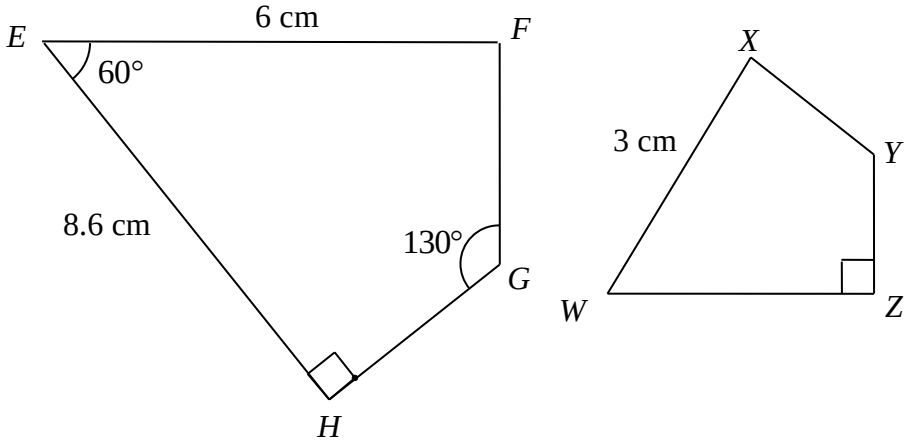
---

10 If Jenny buys x kg of sugar at the price of 99 cents, how much will y kg of sugar cost in dollars? Express your answer in terms of x and y.

Answer $ ……..…… [2]

---

11 Quadrilateral *WXYZ* is a reduction of quadrilateral *EFGH*.
XW = 3 cm, *EF* = 6 cm and *EH* = 8.6 cm.
Angle $\angle FEH = 60^{\circ}$, angle $FGH = 130^{\circ}$ and angle $WZY = 90^{\circ}$.



Find

(a) the scale factor,

Answer ……..…… [1]

(b) *WZ*,

Answer *WZ* = ……..……. cm [1]

(c) Angle *WXY* .

Answer Angle *WXY* = ..…… [1]

---

12 Tim scored 16 out of 20 marks in Test A and 49 out of 56 marks in Test B.
In which test did Tim do better? Justify your answer.

Answer

[2]

---

13 Solve these simultaneous equations.

$$5x - 2y = 16$$
$$x + 3y = -7$$

Answer $x =$ ....., $y =$ ..... [3]

---

14 Three bells ring every 15 minutes, 21 minutes and 25 minutes respectively.

(a) Given that they rang together at 08 30, when will they next ring together again?

Answer ……...…… [2]

(b) How many times will they ring together over a period of 19 hours?

Answer ……...…… [1]

---

15 **(a)** Express $x^2 + 6x + 2$ in the form $(x + a)^2 - b$.

Answer ……...…… [1]

(b) Hence solve $x^2 + 6x + 2 = 0$.

Answer ……...…… [3]

---

16 p is inversely proportional to the square of x.
When $x = 3$, $p = 20$.

(a) Show that $p = \frac{180}{x^2}$.

Answer

[2]

(b) Find the values of x when $p = 7.2$.

Answer x = ……. or …….. [2]

---

17 **(a)** Show that the point (1, 2) lies on the line $3y = 2x + 4$.

Answer

[1]

(b) Find the coordinates of the y-intercept of the line $3y = 2x + 4$

Answer (……..….. , ……..…...) [1]

---

18 **(a)** The ratio of Peter's age to his father's age is 2 : 7.
Peter is 14 years old now. How old is his father?

Answer ……...…… [1]

(b) The ratio of George's age to his mother's age is 3 : 8.
The total of their ages is 66 years.

(i) How old is George?

Answer ……...…… [2]

(ii) Find George's mother's age to his age 3 years from now.

Answer ……...…… [2]

---

19 **(a)** In a regular polygon, the interior angle is $120°$.
Calculate the number of sides of the polygon.

Answer ……...…… [2]

(b) Explain why the exterior angle of a regular polygon cannot be $23°$.

Answer

[2]

---

20 Detergent powder is being sold in packet of 2 different sizes.
The small packet costs \$8.70 and weighs 600 g.
The larger packet costs \$19.50 and weighs 1.5 kg.

(a) Which packet gives a better value? Show your working clearly.

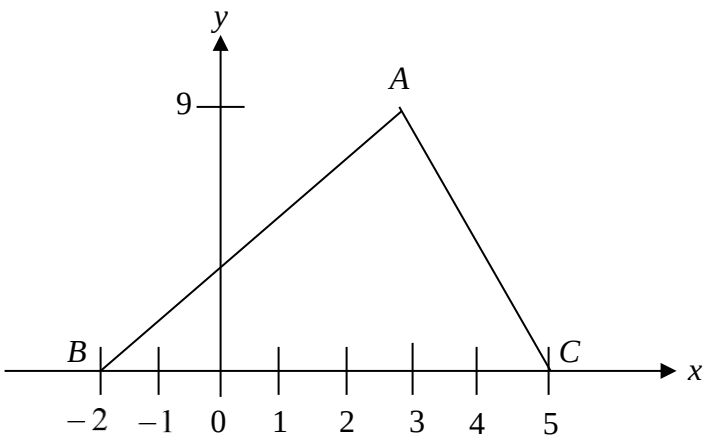
Answer ……...…… [3]

(b) The manufacturer decides to change the price of the small packet so that both packets cost the same unit price. Find the new price of the small packet.

Answer $ ..……..…… [1]

---

21 The diagram below shows the points $A(3, 9)$, $B(-2, 0)$ and $C(5, 0)$.



Find

(a) the gradient of AC,

Answer ……..…… [1]

(b) the equation of AC,

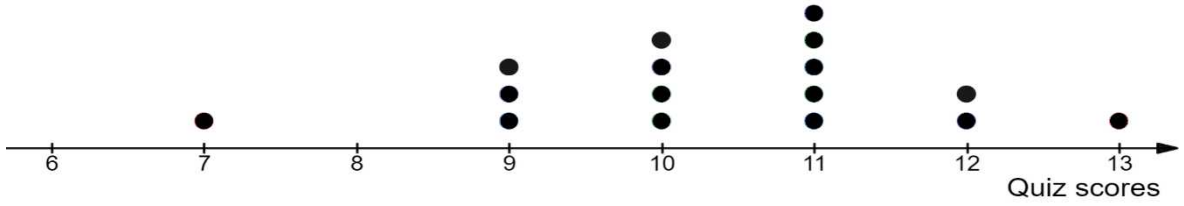
Answer ……..…… [2]

(c) the equation of the line parallel to BC which passes through A.

Answer ……...…… [1]

---

22 The following dot diagram shows the quiz scores of some students.



(a) Find the total number of students who took the quiz.

Answer ……...…… [1]

(b) State the modal score.

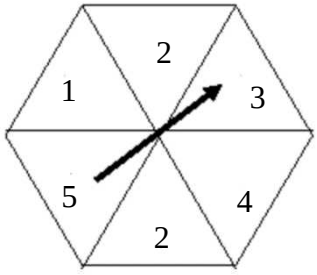
Answer ……...…… [1]

(c) Explain why the mean of the above data may not be a good representation of how the students scored in the quiz

Answer

[2]

23 A spinner in the form of a regular hexagon is constructed as shown below.



When the pointer is spun, find the probability that the pointer will stop at

(a) 5,

Answer ……...…… [1]

(b) 6,

Answer ……...…… [1]

(c) either 1 or 2,

Answer ……...…… [1]

(d) a prime number.

Answer ……...…… [1]

End of Paper

Original

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2024 PR L A Y E NAT O
S CO DARY 4 OR AL (ACA C)

CANDIDATE NAME

CLASS INDEX NUMBER

MATHEMATICS SYLLABUS A 4045/01

Paper 1 5 August 2024

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For Examiner's Use

Total **70**

[Turn over

This paper consists of **14** printed pages, including this cover page.

Mathematical Formulae

Compound interest

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

Mensuration

Curved surface area of a cone = πrl

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

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

V $\frac{4}{3}\pi r^3$

Area n C

Arc ler adians

Sector ar radians

Trigonometry

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

Statistics

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

Standard deviation = $\sqrt{\Sigma f \quad (\Sigma f)}$

Answer **all** the questions.

1 It is given that $m = \dfrac{78.9}{24.05 - 7.85}$

(a) Without the use of a calculator, estimate the value of m. Show your working clearly

$m \approx \dfrac{80}{\sqrt{\ }}$

$= \sqrt{16}$

Answer 20

Answer

Answer

Answer

3 Find the least integer x satisfying $5x > -21$

Answer [2]

4 3, 8, 13, 18, 23,

(a) Find an algebraic expression for the *n*th term in the sequence.

$T_n = 3 + (n-1)5$

$= 3 + 5n - 5$

$= 5n - 2$

$5n - 2$ [1]

(b) Show that 403 is

Answer

Since n is a whole number, 403 is a term in the sequence. (1m)

5 **(a)** Find the obtuse angle of A such that sin $A^\circ = 0.8667$.

Acute $\angle A = 60.077^\circ$

$\therefore$ Obtuse $\angle A = 180 - 60.077^\circ$

$= 119.92^\circ$

$= 119.9^\circ$ (1dp)

$32.5\% = 0.325$

$0.3\dot{2} = 0.3222\ldots$

[1 error → −1m]

$\frac{64}{625}$ 0.32

6 **(a)** Write $\dfrac{5^4 \times 5^2}{\sqrt{5}}$ as a single power of 5

$\frac{5^6}{5^{\frac{1}{2}}}$ (Im)

$5^{5-\frac{1}{2}}$ (

$5^{5\frac{1}{2}}$

[2]

$\frac{1}{2^5} =$

$2^{-5} =$

Comparing

$\therefore m$

[2]

7

(a) $2ap - 6bp + aq - 3b$

$= 2p(a - 3b) + q$

$= (2p + q)(a -$

$(2p +$ $(a - 3b)$ [1]

$5x$

$-4x$

$2x^2 - 10x$

Answer $(2x+5)(x-2)$ [1]

8 In a sale, the price of a watch was reduced by 30% of its original price to \$385. Find the original price of the watch.

70% → \$385 (1m)

Original price = $\frac{385}{70} \times 100$

= \$550 (1m)

550

[2]

9

[1 error → -1m]

10

x kg → \$0.99

1 kg → \$$\frac{0.99}{}$ (1m)

∴ y kg

(1m) or

x

11 Quadrilateral *WXYZ* is a reduction of quadrilateral *EFGH*.
$XW = 3$ cm, $EF = 6$ cm and $EH = 8.6$ cm.
$\angle FEH = 60°$, $\angle FGH = 130°$ and $\angle EHG = \angle WZY = 90°$.

6 cm

F

(a) the scale factor,

SF = $\frac{XW}{EF}$

= $\frac{1}{2}$

(b)

= 4.3

$\angle WXY = \angle EFG$

= $360° - 130° - 90° - 60°$

=

12

Answ

x 100 = 87.5%

m - 8 | test %
wrect

Tim did better in Test B because he scored a gher % in Test B (1m)

13 Solve these simultaneous equations

From
x (1m)
Subst into (1) (1m)
5(
-:

y = -
∴ x = -7 - 3(
= -7+9
= 2 (1m)

15, 21 25
5 5 25
5 7 5
7 7
1,
LCm = $3 \times 5^2 \times 7$

(

Method 2
(2) × 5
$5x + 15y = -35$ — (3) (1m)
(1) - (3)
(1m)

525 min = 8.75h

Answer 2 [1]

15 Express x^2+6x+2 in the form $(x+a)^2-b$.

$= x^2+6x+\left(\frac{6}{2}\right)^2-\left(\frac{6}{2}\right)^2+2$

$=(x+3)^2-9+2$

$=(x+3)^2-7$

Answer $(x+3)^2-7$ ... [1]

sf)

Answer $x=-5.65$ [3]

16

Answer) (lm)

[2]

Answer [2]

$x=\sqrt{7.2}$

$=\pm 5$

17 **(a)** Show that the point (1, 2) lies on the line $3y = 2x + 4$

Answer

For pt (1, 2), when $x = 1$,

$3y = 2(1) + 4$

$= 6$

$y = 2$

$\therefore$ Pt (1, 2) lies on the line [1]

(b) Find the coordinates of the y-intercept of the line $3y = 2x + 4$

For y intercept, $x = 0$

$\therefore 3y = 2(0) + 4$

$y = \frac{4}{3}$

$\therefore$ y intercept is $(0, \frac{4}{3})$

) [1]

18 **(a)** The ratio of Peter's age to his father's age is 2 : 7.
Peter is 14 years old now. How old is his father?

Father's age $= \frac{7}{2} \times 14$

$= 49$ yrs

49 yrs [1]

(i

66

6 yrs (1m)

George's age $= 6 \times 3$

yrs [2]

3 yrs from now, George age $= 18 + 3$

$= 21$ yrs

Mother's age $= 8(6) + 3$

$= 51$ yrs (1m) [2]

19 **(a)** In a regular polygon, the interior angle is 120°.
Calculate the number of sides of the polygon.

(1m)

$180n - 360 = 120n$

$60n = 360$

$n = 6$ (1m)

6

[2]

(b

Answer ∠ exterior $\angle = 23°$

[2]

is not a

20

Larger packet 500 g → \$19.50

g → \$ 0.013 (1m)

Larger packet gives a better value

Answer .....L. ...packet [3]

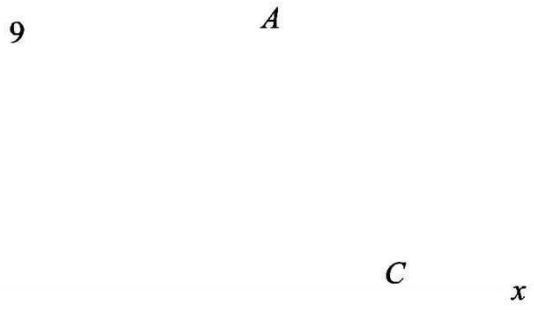
(b) The manufacturer decides to change the price of the small packet so that both packets cost the same unit price. Find the new price of the small packet.

New price of small packet = 600 × \$ 0.013

= \$ 7.80

Answer \$ 80 [1]

21 The diagram below shows the points $A(3, 9)$, $B(-2, 0)$ and $C(5, 0)$.



(a) the gradient of AC,

$m_{BC} = \frac{9-0}{3-5}$

$= \frac{9}{-2}$

or $-4\frac{1}{2}$

[1]

(b) the equation of AC,

Consider

$9 = -\frac{9}{2} + c$

$c = \frac{45}{2}$

Equation of AC $\quad y = -\frac{9}{2}x + \frac{45}{2}$

$-\frac{9}{2}x + \frac{45}{2}$

[2]

$y = 9$

[1]

22 The following dot diagram shows the quiz scores of some students.

Quiz scores

(a) Find the total number of students who took the quiz.

Total = 1 + 3 + 4 + 5 + 2 + 1
= 16

(b) Stat

(c) Exp
how

Answer of the scores are centred around 9 to 12 marks. (1m)

The outlier of 7

or other acceptable answer

[2]

23 A spinner in the form of a regular hexagon is constructed as shown below

When the pointer is spun, find the probability that the pointer will stop at

(a) 5,

1/6 [1]

(b) 0 [1]

(c) P(1 or 2) = 3/6 = 1/2

1/2 [1]

(d) a prime number.

P(prime) = 3/6 = 1/2 [1]

End of Paper

GREENRIDGE SECONDARY SCHOOL
2024 PRELIMINARY EXAMINATION
SECONDARY 4 NORMAL (ACADEMIC)

CANDIDATE NAME	
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MATHEMATICS SYLLABUS A 4045/02

Paper 2 6 August 2024

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Statistics

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

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

Answer **all** the questions.

1 **(a)** Express $7\frac{1}{5}$ as a percentage.

Answer ……..……..… % [1]

(b) Express 40.4% as a fraction in its simplest form.

Answer ……..……..... [1]

(c) Simplify $\frac{32x^3y^2}{8} \times \frac{5x^3}{20y^6}$.

Answer ……..……..…….. [2]

(d) Simplify $\frac{25x^2 - 4}{6 + 15x}$.

Answer ……..……..... [2]

2 **(a)** Write as a single fraction in its simplest form $\frac{5x}{6} - \frac{1-x}{4}$.

Answer ……..……..…….. [2]

(b) Solve the equation $\frac{6}{2-5x} = \frac{1}{3}$.

Answer ……..…… [2]

(c) It is given that $x = \frac{a^2 - 5}{b}$.

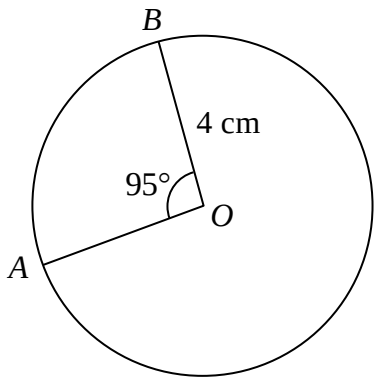
(i) Find the value of x when $a = 5$ and $b = 2$.

Answer x = ……..…… [2]

(ii) Express a in terms of b and x.

Answer ……..…… [1]

3 A circle with centre O has a radius of 4 cm.
A and B are points on the circumference of the circle.
Given that $\angle AOB = 95°$, calculate



(a) the circumference of the circle,

Answer ……...…… cm [1]

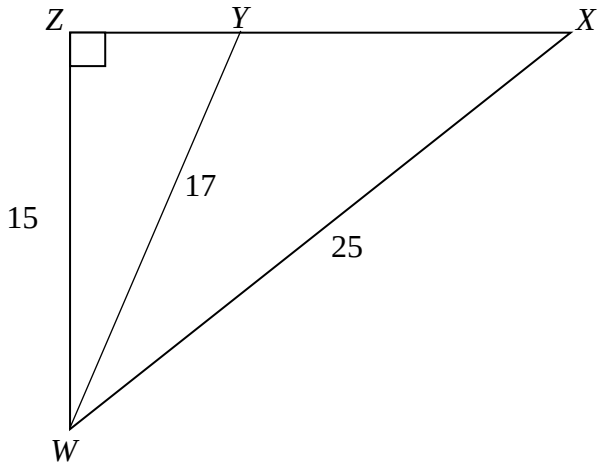
(b) the perimeter of the sector AOB,

Answer ……...…… cm [2]

(c) the area of the minor sector AOB.

Answer ……...…… cm^2 [2]

4 In the diagram, XYZ is a straight line, $WX = 25$ cm, $WY = 17$ cm and $WZ = 15$ cm. It is given that angle $XZW = 90°$. Calculate



(a) the length of XY,

Answer ……...…… cm [2]

(b) angle ZWY,

Answer Angle ZWY = …… [1]

(c) angle YWX,

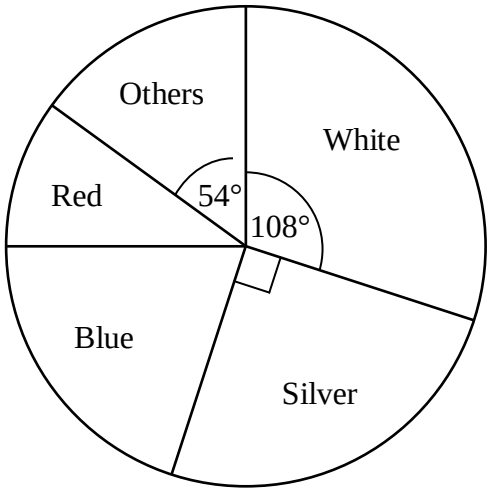
Answer Angle YWX = …… [2]

(d) the area of triangle WXY.

Answer ……..…… cm^2 [1]

---

5 Kevin recorded the colour of cars that entered a carpark in an hour.
The pie chart shows his results.



(a) There were twice as many blue cars as red cars.
Find the angle representing blue cars.

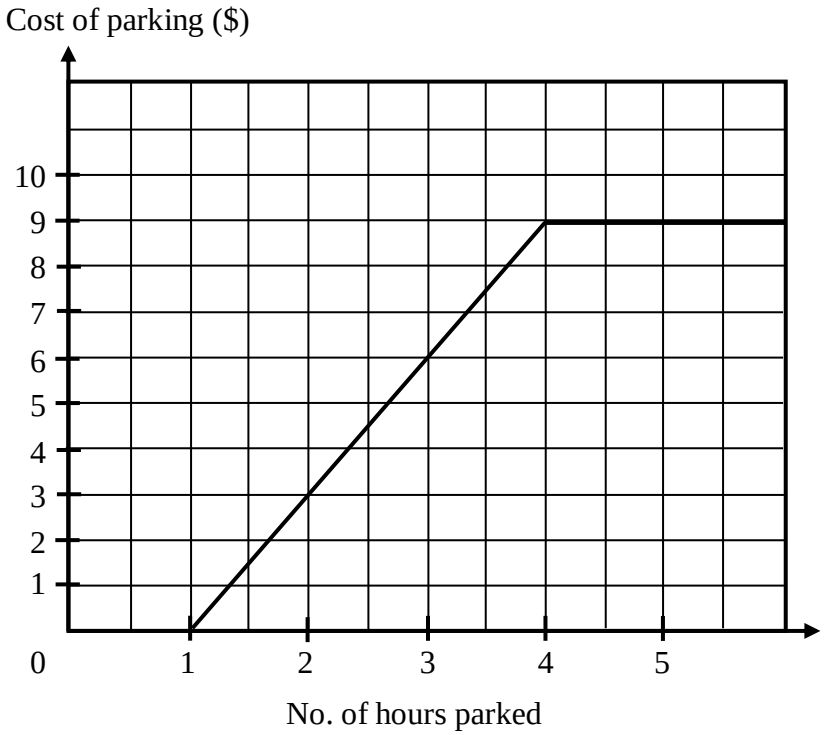
Answer ……..…… [2]

(b) Given that there were 66 white cars, find the total number of cars in the survey.

Answer ……..…… [2]

---

6 The graph shows the parking fees charged by a shopping mall.



Find

(a) the maximum number of minutes that the shopping mall offered free parking,

Answer ……..…… minutes [1]

(b) the duration a car is in the carpark if the parking cost is $6,

Answer ……..…… hours [1]

(c) the cost of parking if a person parks his car for 4.5 hours,

Answer $ ……..…… [1]

(d) the least number of hours he has parked if the person has paid $9.00 for the parking.

Answer ……..…… hours [1]

---

7 **(a)** The scale of a map is 1 : 40 000.

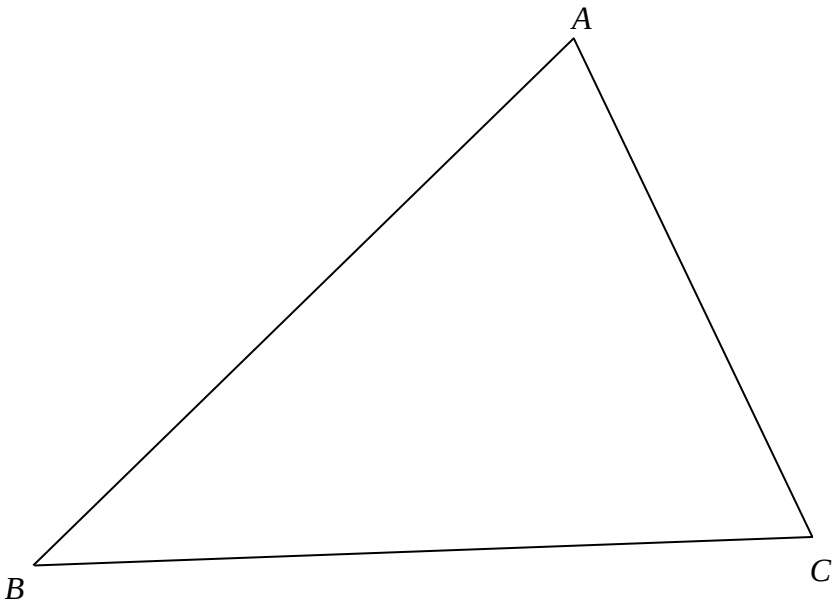
(i) The distance between two railway stations is 8 cm on a map.
Find, in kilometres, the actual distance between the stations.

Answer ……..... km [2]

(ii) A field has an area of 90 km^2.
Find the area of the field on the map in square centimetres.

Answer ……..... cm^2 [2]

7b



(b) The point *X* is the point of intersection of the bisector of angle *CAB* and the perpendicular bisector of *AC*.

(i) Measure angle *ABC*.

Answer Angle *ABC* = ……..... [2]

(ii) Construct the bisector of angle *CAB* and the perpendicular bisector of *AC*. Hence, label the point *X*. [3]

(iii) Measure and write down the length of *AX*.

Answer *AX* = ……..... [1]

8 Mr Lim bought x shirts, each at the same price, for a total cost of \$168.

(a) Write down an expression for the cost of each shirt in terms of x.

Answer \$ ……..…… [1]

Mr Lim bought $(x+5)$ pairs of slacks, each at the same price, for a total cost of \$450.

(b) Write down an expression for the cost of each pair of slacks in terms of x.

Answer \$ ……..…… [1]

(c) If 2 shirts and a pair of slacks cost \$134 altogether, form an equation in x and show that it reduces to $67x^2 - 58x - 840 = 0$.

Answer

[3]

(d) Solve the equation $67x^2 - 58x - 840 = 0$.

Answer x = ……. or x = …… [2]

9 A ball was thrown from the top of a vertical tower.
The height, h metres, of the ball **above the top of the tower** at a time t seconds after it was thrown is given by the equation $h = 22t - 5t^2$.

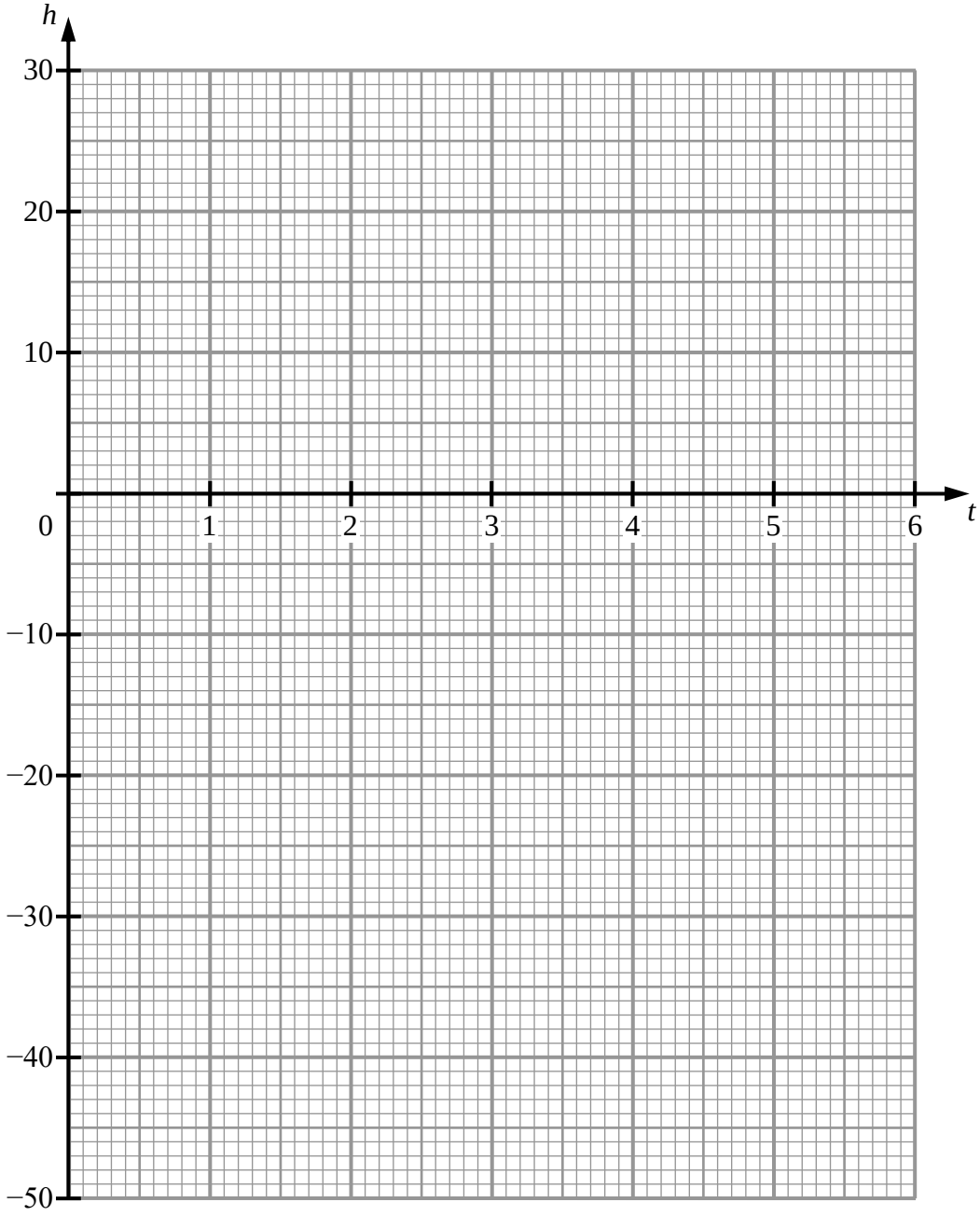
This is a table of values for $h = 22t - 5t^2$.

t	0	1	2	3	4	5	6
h	0	17	24	21	8	p	−48

(a) Calculate the value of p.

Answer p = ……..…… [1]

(b) Draw the graph of $h = 22t - 5t^2$ for $0 \leq t \leq 6$.



[2]

(c) Use your graph to find

(i) the greatest height of the ball above the top of the tower,

Answer ……...…… m [1]

(ii) the time when the ball was 13 metres above the top of the tower.

Answer ……...…… s [1]

(d) By drawing a tangent, estimate the gradient of the graph of $h = 22t - 5t^2$ when $t = 3.5$.

Answer ……...…… [2]

10 Peter stays in Punggol and goes to school in Bukit Timah.
He has to take the train every morning at Punggol MRT station to Tan Kah Kee MRT station.
He wants to find the fastest route from home to school.
Tables 1 and 2 are two possible routes that he can take.

Table 1

Route 1

	MRT Stations	Time taken (min)	Distance between the stations (km)
North East Line	Punggol → Serangoon	11	7.6
Circle Line	Serangoon → Botanic Gardens	14	9.3
East West Line	Botanic Gardens → Tan Kah Kee	2	1.1

Table 2

Route 2

	MRT Stations	Time taken (min)	Distance between the stations (km)
North East Line	Punggol → Little India	21	13.2
East West Line	Little India → Tan Kah Kee	10	5.4

(a) Find the average speed, in km/h, of

(i) Route 1,

Answer ……..……. km/h [1]

(ii) Route 2.

Answer ……..……. km/h [1]

(b) Which route should Peter choose? Explain your answer.

Answer

[2]

(c)

Train Service Frequencies (in minutes)	
	Monday – Friday
Peak (6.30 a.m. to 9 a.m. & 5 p.m. to 7.30 p.m.)	3
Off-peak	5

Given that the first train arrival at Punggol MRT station is 05 42.

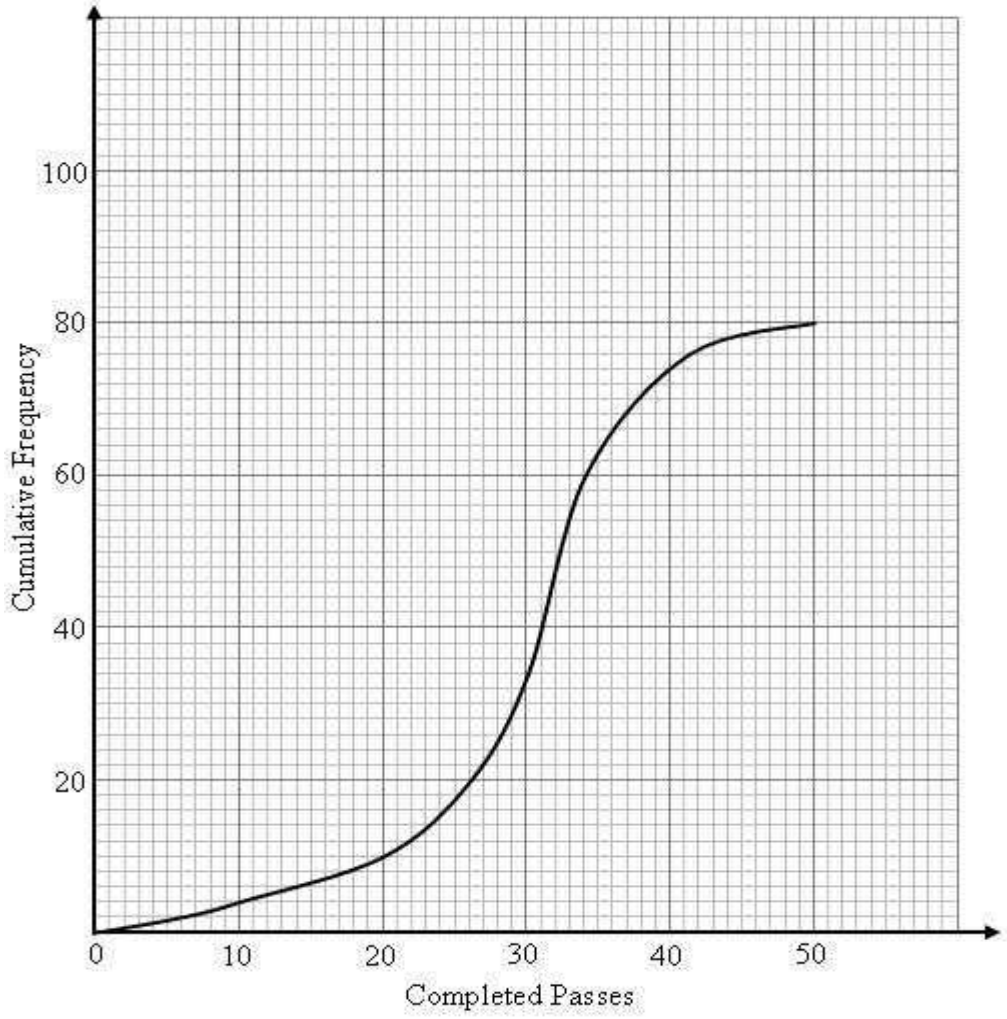
Using your answer in part **(b)**, calculate the latest train time that Peter needs to take to arrive in school by 07 15.

Answer

[2]

Section B (8 marks)
Answer **one** question from this section.

11 **(a)** The cumulative frequency graph shows the distribution of completed passes data taken from 80 different players in one of the World Cup Football Competition matches.



Use the graph to find

(i) the median,

Answer ……..…….…..…... [1]

(ii) the inter-quartile range,

Answer ……..…….…..…... [2]

(iii) the number of players who scored at least 37 completed passes in their match.

Answer ……..…….…..…... [1]

[Turn over

11 **(b)** The table below shows the marks obtained by 110 students from Alton Secondary School in the recent Science examinations.

Mark (x)	Frequency
$0 < x \leq 20$	4
$20 < x \leq 40$	16
$40 < x \leq 60$	45
$60 < x \leq 80$	30
$80 < x \leq 100$	15

(i) Calculate an estimation of the mean mark.

Answer ……...…… [1]

(ii) Calculate the standard deviation.

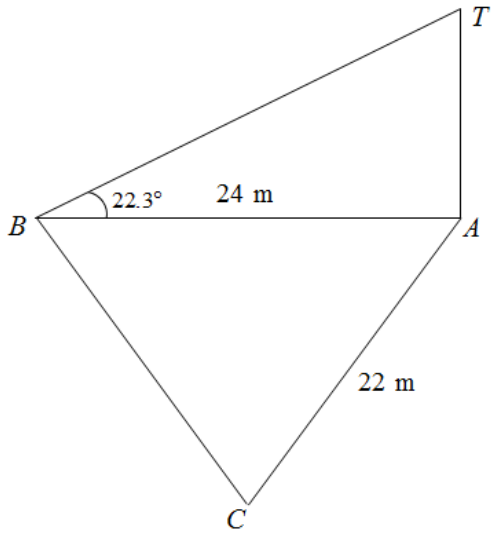
Answer ……...…… [1]

(iii) For Hilton Secondary, the mean mark was 53 and the standard deviation was 19.
Which school's students performed more consistently for the examinations?
Give a reason for your answer.

Answer

[2]

12 **(a)** In the diagram, A is the foot of a cliff and B and C are boats in the sea.
A is due east of B and the bearing of C from A is $214°$.
$AB = 24$ m and $AC = 22$ m.



(i) The angle of elevation of the top of the cliff, T, from B is $22.3°$.
Find the height of the cliff, TA.

Answer ……..……..…... m [1]

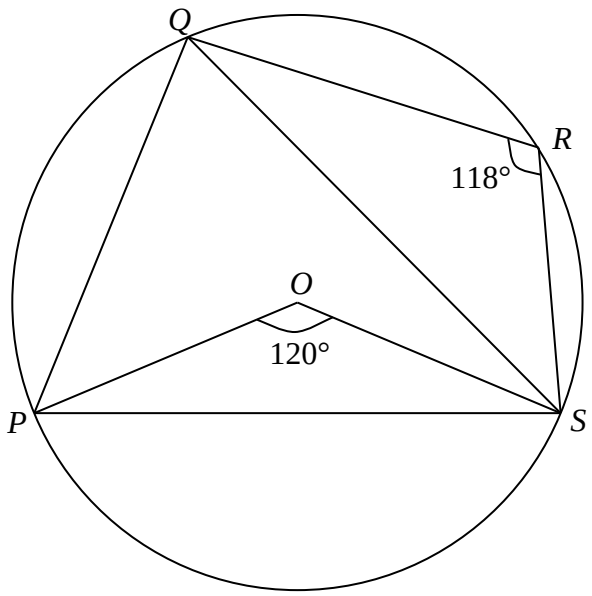
(ii) Calculate angle BAC.

Answer Angle BAC = ……..... [1]

(iii) Find the distance BC.

Answer BC = ……..... m [2]

12 **(b)** In the diagram *P*, *Q*, *R* and *S* are four points on the circle centre, *O*.
Given that angle *POS* = 120° and angle *QRS* = 118°.



Find these angles, giving a reason for each.

(i) Angle *PQS*

Angle *PQS* = …… Reason ……

…… [2]

(ii) Angle *QPS*,

Angle *QPS* = …… Reason ……

…… [2]

End of Paper

original

GR RI GE S CONDARY SC OOL
2024 PR L ARY E I AT O
S CONDARY 4 NOR AL (ACAD C)

CANDIDATE NAME

CLASS INDEX NUMBER

MATHEMATICS SYLLABUS A **4045/02**

Paper 2 6 August 2024

Setter: Mrs Goh-Kok Mei Leng 2 hours

Candidates answer on the Question Paper.

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your class, index 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.

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 70.

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

Total **70**

[Turn over

This paper consists of **19** printed pages, including this cover page

Mathematical Formulae

Compound interest

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

Mensuration

Curved surface area of a cone = πrl

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

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

Volum $\frac{4}{3}\pi r^3$

Area of tr $b\sin C$

Arc length = n radians

Sector area = s in radians

Trigonometry

$\frac{a}{\sin}$ c

$a^2 =$ A

Statistics

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

Standard deviation = $\sqrt{\Sigma f \quad (\Sigma f)}$

Answer **all** the questions.

1 **(a)** Express $7\frac{1}{5}$ as a percentage.

$= 7.2 \times 100$

$= 720\ \%$

720 % [1]

=

101
25 ... [1]

value

$\frac{x^6}{y^4}$ [2]

=

$= 5x \quad 2) \quad (1m)$

=

$\frac{5x-2}{3}$

$\frac{\quad}{3} \quad (1m)$ [2]

2 **(a)** Write as a single fraction in its simplest form $\frac{5x}{6}-\frac{1-x}{4}$.

Answer [2]

(1m)

Answer [2]

(c) It is given that

(i) Find the ... and $b = 2$

5

=

Answer ... [2]

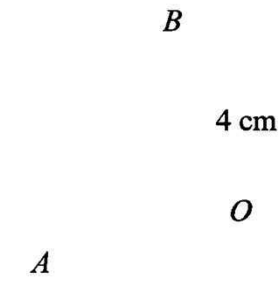
(ii) Express a in terms of b and x.

$a^2 - 5 = xb$

$a^2 = xb + 5$

Answer $\pm\sqrt{xb+5}$ [1]

3 A circle with centre O has a radius of 4 cm. A and B are points on the circumference of the circle. Given that $\angle AOB = 95°$, calculate



(a) the circumference of the circle,

Circumference = $2\pi r$
$= 2\pi(4)$
$= 8\pi$ 25.133
$= 25.1$ cm (3sf)
25.1

Arc AB = $\frac{95}{360} \times 2\pi(4$
$= 6.632$ (1m)
Perimeter = $6.632 + 4 +$
$= 14.632$
$= 14.6$ cm (

(c) the area

(1m)
3
=
13.3 cm² (3sf) (1m)
13.3 cm² [2]

4 In the diagram, XYZ is a straight line, $WX = 25$ cm, $WY = 17$ cm and $WZ = 15$ cm. It is given that angle $XZW = 90°$. Calculate

a)

$XY = 20 - 8$
$= 12$ cm

$YZ^2 = 17^2 - 5^2$
$YZ = \sqrt{64}$
$= 8$ cm

Im if either YZ or XZ correct

[2]

$\cos ZWY = \frac{15}{17}$
$\angle ZWY = 28.072°$
$= 28.1°$ (1 dp)

28.1

[1]

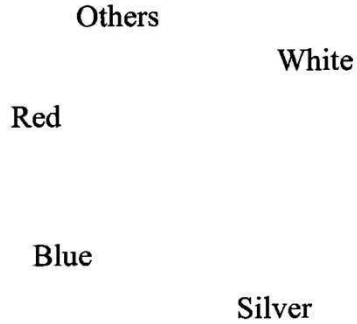
b

[2]

(d) the area

Answer 90 .. cm^2 [1]

5 Kevin recorded the colour of cars that entered a carpark in an hour
The pie chart shows his results.



(a) There were twice as many blue cars as red cars.
Find the angle representing blue cars.

Blue : Red = 2 : 1

3 parts = 360° − 54 − 108 − 90

= 108°

108° = [illegible]

Angle for blue cars = 36° × 2

= 72°

... [2]

survey.

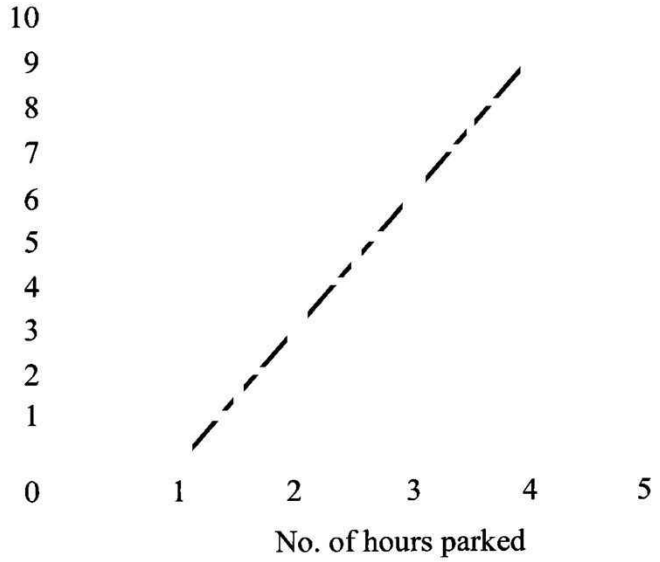
108° ⟶ 66 cars

Total no. of cars

=

Answer 220 [2]

6 The graph shows the parking fees charged by a shopping mall. Find



(a) the maximum number of minutes that the shopping mall offered free parking,

Answer 60 ... minutes [1]

(b) the duration a car is in the carpark if the parking cost is $6,

Answer 3 hours [1]

(c) the cost of parking if a person parks his car for 4.5 hours,

Answer $ 5 [1]

(d) the least number of hours he has parked if the person has paid $9. the parking.

Answer 4 hours [1]

7 **(a)** The scale of a map is 1 : 40 000.

(i) The distance between two railway stations is 8 cm on a map.
Find, in kilometres, the actual distance between the stations.

1 cm : 40 000 cm
1 m : 0.4 km (1 m)
∴ 8 cm represents 8 × 0.4
= 3.2 km (1 m)

3.2 km [2]

(ii) A field has
Find the are

0.4 km : 1 cm
1 km : $\frac{1}{0.4}$ = 2.5 cm
1 km^2 : 2.5^2 cm^2 (1 m)
= 6.25 cm^2
Area of track = 90 × 6.25
= 562.5 cm

Answer 562.5 .... cm^2 [2]

7b

A

b (iii) (1m)

x b (iii) ( )

B

b (iii) (1m)

(b) The point *X* is the point of intersection of the bi
perpendicular bisector of *AC*.

(i) Measure angle *ABC*.

A

(ii) Construct the bisector of angle *CAB* and t
Hence, label the point *X*.

(iii) Measure and write down the length of *AX*

Answer $AX = \ldots$ 4.4 cm [1]

8 Mr Lim bought x shirts, each at the same price, for a total cost of \$168.

(a) Write down an expression for the cost of each shirt in terms of x.

$\frac{168}{x}$

$\frac{450}{x+5}$

(c) If 2 shirts and a pair of slacks cost \$134 altogether, form an equation in x and show that it reduces to $67x^2 - 58x - 840 = 0$.

$2\left(\frac{168}{x}\right) + \left(\quad\right) = 134$ (1m)

$336(x+5) + 450x = 134x(x+5)$ (1m)

$336x + 1680 + 450x = 134x^2 + 670x$

$134x^2 + 670x - 786x - 1680 = 0$

$\div 2$ $67x^2 - 58x - 840 = 0$ (shown) (1m)

$x = -(-58) \pm \sqrt{(-58)^2 - 4(67)(-840)}$ (1m)

$=$

(1m)

Answer $x = 3.13$ [4]

9 A ball was thrown from the top of a vertical tower.
The height, h metres, of the ball **above the top of the tower** at a time t seconds after it was thrown is given by the equation $h = 22t - 5t^2$.

This is a table of values for $h = 22t - 5t^2$.

t	0	1	2	3	4	5	6
h	0	17	24	21	8	p	−48

(a) Calculate the value of p.

$p = 22(5) - 5(5)^2$
$= 125$

Answer $p =$ ..... −15 [1]

(b) Draw the graph of $h = 22t - 5t^2$ for $0 \le t \le 6$

m

t

−1

−5

[2]

(c) Use your graph to find

(i) the greatest height of the ball above the top of the tower,

Answer 24 ± 0.1 m [1]

(ii) the time when the ball was 13 metres above the top of the tower

0.75 3.7 s [1]
± 0.1

(iii) By dr $-5t^2$ when $t = 3$.

$m = \frac{30}{4.7 - 2.3}$

$= -12.$ (± 1 (1m)

Correct tangent (1m)

Answer -12.5 [2]

10 Peter stays in Punggol and goes to school in Bukit Timah. He has to take the train every morning at Punggol MRT station to Tan Kah Kee MRT station. He wants to find the fastest route from home to school. Tables 1 and 2 are two possible routes that he can take.

Table 1

Route 1	MRT Stations	Time taken (min)	Distance between the stations (km)
North East Line	Punggol → Serangoon	11	7.6
Circle Line	Serangoon → Botanic Gardens	14	9.3
East West Line	Botanic Gardens → Tan Kah Kee	2	1.1

Table 2

Route 2	MRT Stations	Time taken (min)	Distance between the stations (km)
North East Line	Punggol → Little India	21	13.2
East West Line	Little India → Tan Kah Kee	10	5.4

(a) Find the average speed, in km/h, of

(i) Route 1

$7.6 + 9.3 + 1.1$

40 km/h (1m)

40 km/h [1]

Speed $= \frac{13.2 + 5.4}{21 + 10} \times 60$

$\times 60 = 36$ km/h

36 km/h [1]

(b) Which route should Peter choose? Explain your answer.

Answer Time for route 1 = 27 min

Time for route 2 = 31 min

Peter should choose route 1 as the total time taken is 4 min shorter

or Average speed is faster by 4 km/h [2]

m - evidence

m - conclusion

(c)

Train Service Frequencies (in minutes)

	Monday – Friday
Peak (6.30 a.m. to 9 a.m. & 5 p.m. to 7.30 p.m.)	3
Off-peak	5

Given that the first train arrival at Punggol MRT station is 05 42.

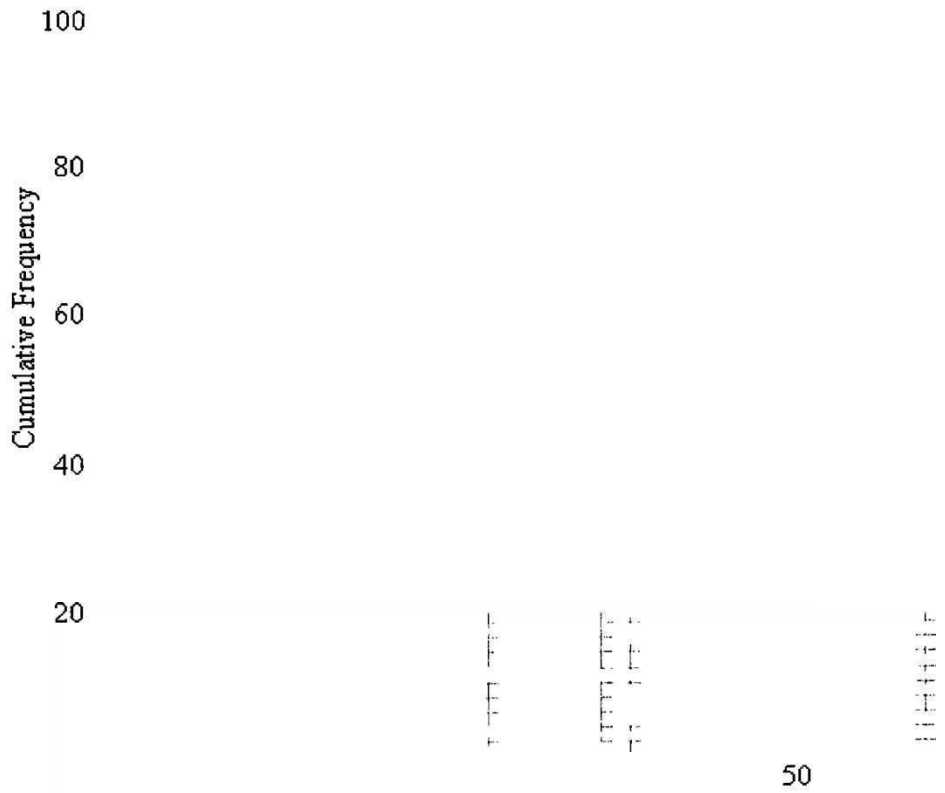
Using your answer in part **(b)**, calculate the latest train time that Peter needs to take to arrive in school by 07 15.

Latest time Peter has to be on the train = 07 15 − 0027
= 06 48 (1m)

First train = 0542
Considering 5 min frequency for off peak (before 06 30)
= 0542 + 10(5) = 06 32
Considering 3 min frequency for peak after 06 30)
= 0632 + 5(3)
= 06 47 (1m)
∴ Latest train time Peter needs to take is 06 47

Section B (8 marks)
Answer **one** question from this section.

11 **(a)** The cumulative frequency graph shows the distribution of completed passes data taken from 80 different players in one of the World Cup Football Competition matches.



Use the gı

(i)

31 [1]

(ii)

Upper quartile = 34 } 1m
Lower quartile = 26 }
IQR 34 - 26 = 8 (1m)

8 [2]

(iii) n their match.

No. scoring less than 37 passes = 68 (1m)
∴ No scoring at least 37 passes = 80 - 68
= 12 (1m)

12 [2]

11 (6) The table below shows the marks obtained by 110 students from Alton Secondary School in the recent Science examinations.

Mark (x)	Frequency
$0 < x \leq 20$	4
$20 < x \leq 40$	16
$40 < x \leq 60$	45
$60 < x \leq 80$	30
$80 < x \leq 100$	15

(a) Calcul
Mea

$16 + 50(45) + 70(30) + 90(15)$

6220

58 6

... [1]

(b) Calcul

$4(10)^2 + 16(30)^2 + 45(50)^2 + 30(70)^2 + 15(90)^2$ $\left(\frac{6220}{110}\right)^2$

110

20.02

Answer [1]

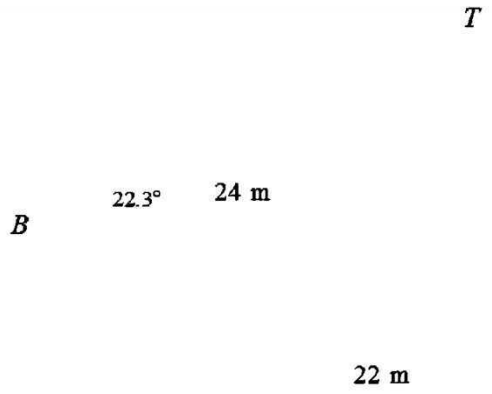
(c) For Hilton Secondary, the mean mark was 53 and the standard deviation was 19
Which school's students performed more consistently for the examinations?
Give a reason for your answer.

Answer

1m- evidence
1m- conclusion [2]

End of Paper

12 **(a)** In the diagram, A is the foot of a cliff and B and C are boats in the sea. A is due east of B and the bearing of C from A is $214°$. $AB = 24$ m and AC = 22 m.



(i) The angle of elevation of the top of the cliff, T, from B is $22.3°$. Find the height of the cliff, TA.

$\tan 22.3° = \frac{TA}{24}$

$TA = 24 \tan 22.3°$

Answer m [1]

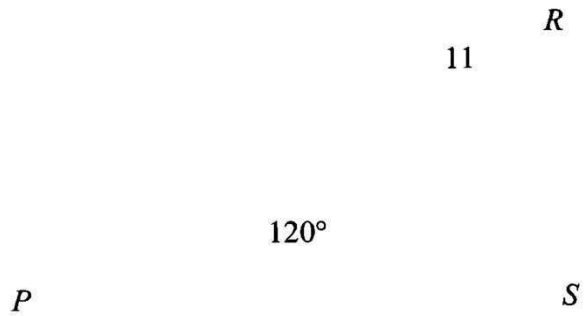
Calculate angl

$\angle$ $360° - 214° - 90°$

[1]

Answer *BC* m [2]

12 (b) In the diagram P, Q, R and S are four points on the circle centre, O. Given that angle $POS = 120°$ and angle $QRS = 118°$.
Find these angles, giving a reason for each.



(i) Angle PQS

120°

An

at circumference [2]

(ii) An

An in opposite segment,

cyclic lateral [2]

End of Paper