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West Spring Secondary School PRELIMINARY EXAMINATION 2018

Mathematics
Paper 1

4045/01

SECONDARY 4 NORMAL (ACADEMIC)

Name _____ () **Date** **13 August 2018**

Class _____ **Duration** **2 hours**

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.

Answer **all** 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 80.

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	
	/80

This document consists of **14** printed pages, including the cover page.

Setter(s) **Mr Liu Youhe**

[Turn over]

Mathematical Formulae*Compound interest*

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

Answer **all** questions.

- 1 By writing each value correct to 1 significant figure, estimate the value of

$$\frac{30.16^2 - 24.96}{9.95}.$$

Show your working.

Answer [2]

- 2 Find the lowest common multiple of 28, 35 and 84.

Answer [2]

- 3 Express

(a) 3.38 km in cm,

Answer cm [1]

(b) 0.26 m^2 in cm^2 .

Answer cm^2 [1]

- 4 Factorise fully $x^2 - 3x + 2xy - 6y$.

Answer [2]

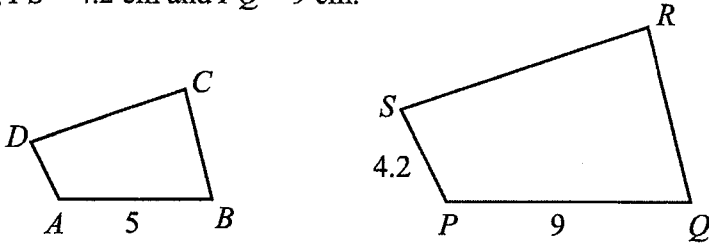
- 5 Solve the inequalities $7 < 4x - 3 < 13$.

Answer [2]

6 Make x the subject of the formula $\sqrt[3]{ax+b} = k$.

Answer [2]

7 Quadrilateral $PQRS$ is an enlargement of quadrilateral $ABCD$.
 $AB = 5$ cm, $PS = 4.2$ cm and $PQ = 9$ cm.



(a) Find the scale factor of the enlargement.

Answer [1]

(b) Find AD .

Answer cm [1]

8 The general term of a sequence is given by $T_n = \frac{8n}{n+1}$.

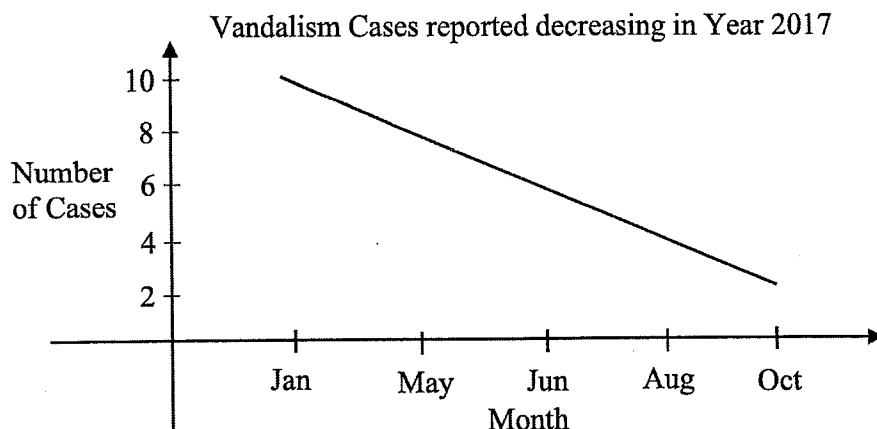
(a) Find T_{32} .

Answer $T_{32} =$ [1]

(b) Explain why 26 is not a term in this sequence.

Answer.....
..... [1]

- 9 The line graph shows the number of vandalism cases reported in Year 2017.



State one feature of the chart that may be misleading and explain why.

Answer.....

 [2]

- 10 (a) Express 792 as the product of its prime factors.

Answer 792 = [1]

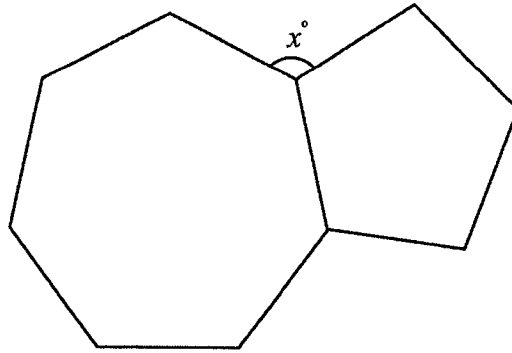
- (b) The number $792k$ is a perfect cube.
 Find the smallest positive integer value of k .

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

- (c) Find the highest common factor of 792 and 54.

Answer [1]

- 11 The diagram shows a sketch of a regular heptagon (seven-sided polygon) and a regular pentagon.



Calculate x .

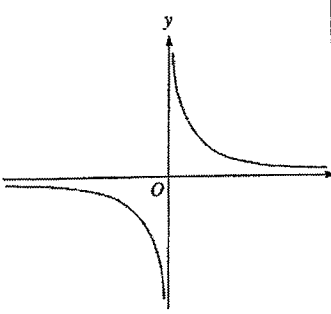
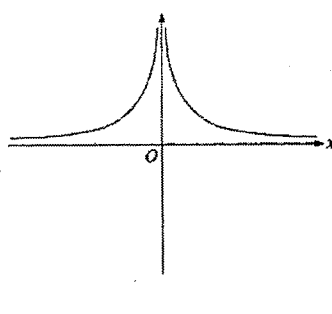
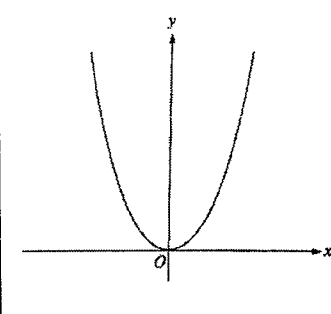
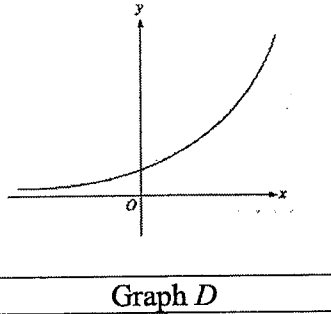
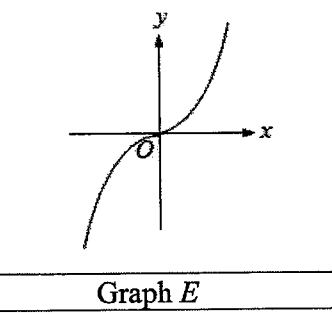
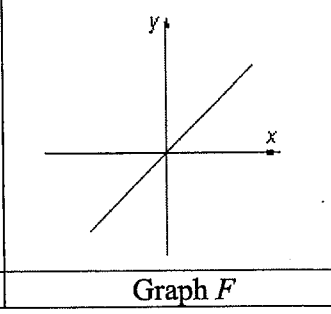
Answer $x = \dots\dots\dots$ [3]

- 12 The entrance fees to a museum for 5 adults and 6 children are \$70 while the entrance fees for 4 adults and 7 children are \$67.

How much would a family of 3 adults and 5 children need to pay?

Answer \$ $\dots\dots\dots$ [3]

13 For each of the following equations, match them with the correct graph.

		
Graph A	Graph B	Graph C
		
Graph D	Graph E	Graph F

(a) $y = x^3$,

Answer Graph [1]

(b) $y = \frac{2}{x}$,

Answer Graph [1]

(c) $y = 2^x$.

Answer Graph [1]

- 14 (a) Express $x^2 - 4x + 2$ in the form $(x - a)^2 + b$.

Answer [2]

- (b) Hence solve the equation $x^2 - 4x + 2 = 0$, giving your answers correct to two decimal places.

Answer $x =$ or [2]

- 15 (a) Factorise $3x^2 + 8x + 4$.

Answer [2]

- (b) Hence, simplify $\frac{3x^2 + 8x + 4}{x^2 - 4}$.

Answer [2]

16 Simplify, giving your answer in positive index notation,

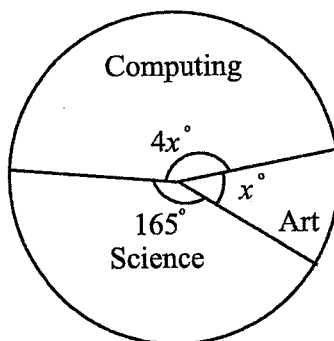
(a) $(x^{-4}y^3)^{-2}$,

Answer [2]

(b) $\sqrt[5]{32x}$.

Answer [2]

17 A number of students in a Junior College were asked to name their favourite subject.



(a) Calculate the value of x .

Answer $x =$ [2]

(b) Given that 364 students chose Computing, calculate the total number of students surveyed.

Answer [2]

- 18 (a) The height of a boy increases from 90 cm to 130 cm.

Calculate the percentage increase in height.

Answer% [2]

- (b) The selling price of a toy after 15% discount is \$51.

Calculate the marked price of the toy.

Answer \$ [2]

-
- 19 The table below shows the distribution of the speeds of 50 cars.

Speed, (v km/h)	Frequency
$30 \leq v < 40$	4
$40 \leq v < 50$	14
$50 \leq v < 60$	10
$60 \leq v < 70$	8
$70 \leq v < 80$	10
$80 \leq v < 90$	4

- (a) Write down the modal class interval of the distribution.

Answer [1]

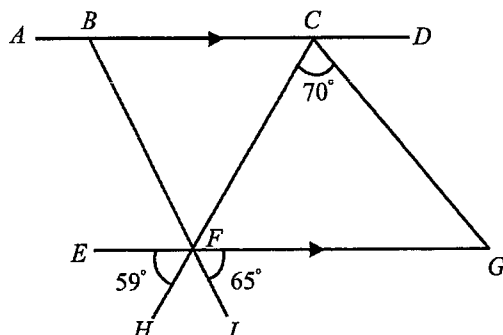
- (b) Calculate an estimate of the mean of the speed.

Answer km/h [2]

- (c) Explain why this is only an estimate of the mean.

Answer.....
..... [1]

- 20 In the diagram, BFI and CFH are straight lines, AD is parallel to EFG . Angle $HCG = 70^\circ$, angle $EFH = 59^\circ$ and angle $GFI = 65^\circ$.



Find

- (a) angle BFC ,

Answer[°] [1]

- (b) angle ABF ,

Answer[°] [1]

- (c) angle CGF ,

Answer[°] [1]

- (d) reflex angle DCG .

Answer[°] [1]

- 21 (a) Keagan invested \$11 400 at an annual rate of 4% simple interest.
After 7 months, he withdraws all the money.

How much interest does he receive?

Answer \$ [2]

- (b) The cash price of a new car is \$98 500.
James buys the car on hire purchase.
He pays a deposit of 10% of the cash price.
He then makes 60 monthly payments of \$1800.

What is the total amount that James pays for the car?

Answer \$ [2]

- 22 The points A , B and C are $(8, 7)$, $(11, 3)$ and $(4, -1)$ respectively.

Find

- (a) the gradient of line AB ,

Answer [2]

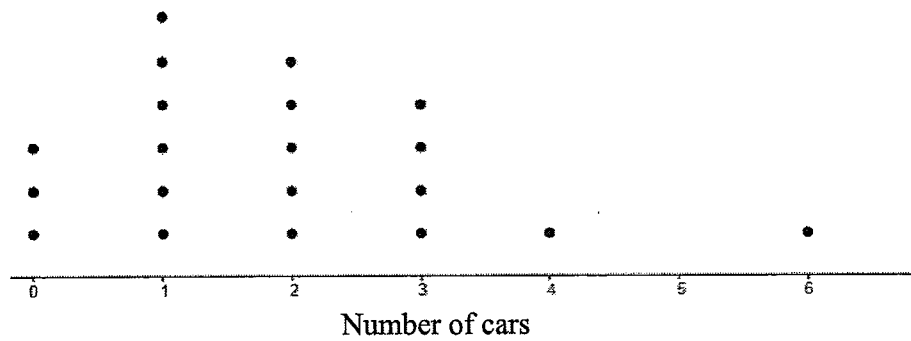
- (b) the equation of the line through C which is parallel to AB ,

Answer [2]

- (c) the length of the line segment BC .

Answer units [2]

- 23 (a) The dot diagram shows the number of cars owned by each of the 20 families in an estate.



Find

- (i) the modal number of cars,

Answer [1]

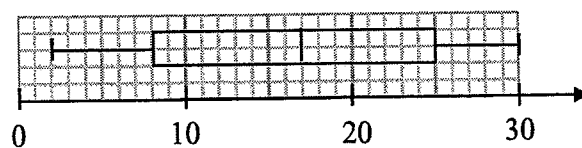
- (ii) the median number of cars,

Answer [1]

- (iii) the mean number of cars.

Answer [2]

- (b) The box-and-whisker diagram below shows the scores of a group of students who took a test.



Find the interquartile range.

Answer [2]

- 24 In triangle ABC , $AB = 11$ cm, $BC = 8$ cm and $AC = 5$ cm.
 AB is drawn below.

Answer



- (a) Construct accurately triangle ABC . [2]
- (b) Measure the largest angle of the triangle.
Answer° [1]
- (c) Construct the perpendicular bisector of BC . [1]
- (d) Construct the bisector of angle BAC . [1]
- (e) The point P is the same distance away from points B and C .
 It is also 7 cm away from A .
 Plot and label point P . [1]

END OF PAPER 1



West Spring Secondary School PRELIMINARY EXAMINATION 2018

Mathematics
Paper 2

4045/02

SECONDARY 4 NORMAL (ACADEMIC)

Name _____ () **Date** **14 August 2018**

Class _____ **Duration** **2 hours**

Materials provided: Graph paper
Writing papers
Cover Page for Answer Scripts

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.

Section A
Answer **all** questions.

Section B
Answer **one** question.

The number of marks is given in [] 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 number of marks for this paper is 60.

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	
	/60

This document consists of 9 printed pages, including the cover page.

Setter(s) **Mr Liu Youhe**

[Turn over]

Mathematical Formulae**Compound interest**

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

Mensuration

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

Section A (52 marks)

Answer **all** the questions in this section.

- 1 Mrs Lim borrowed a sum of money at 8% compound interest per year.
After 3 years she owed a total of \$9447.84.

Calculate how much she borrowed.

[2]

- 2 (a) Write 2480 in standard form.

[1]

- (b) The mass of a particle is 2.58×10^{-10} grams.
A room contains 5×10^9 particles.

Find the mass of the particles in the room.

[2]

- 3 (a) Simplify $2(3x + 7y) - 4(x - 5y)$.

[2]

- (b) Express as a single fraction in its simplest form $\frac{3}{(x+2)^2} + \frac{4}{x+2}$.

[2]

- 4 (a) Find obtuse angles A and B such that

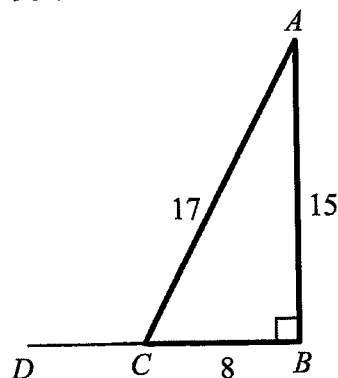
(i) $\cos A = -0.67$,

[1]

(ii) $\sin B = 0.76$.

[1]

- (b) In the diagram, BCD is a straight line.
 $BC = 8$ cm, $AB = 15$ cm, $AC = 17$ cm and $\angle ABC = 90^\circ$.



Find

(i) $\tan BAC$,

[1]

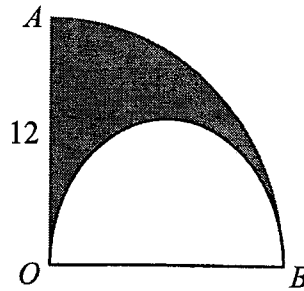
(ii) $\cos ACD$.

[1]

Give both answers as fractions.

4

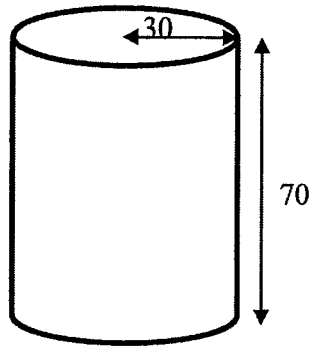
- 5 (a) In the figure, OAB is a quadrant of a circle, radius 12 cm. A semicircle is drawn on OB as the diameter.



Find, in terms of π , the area of the shaded region.

[3]

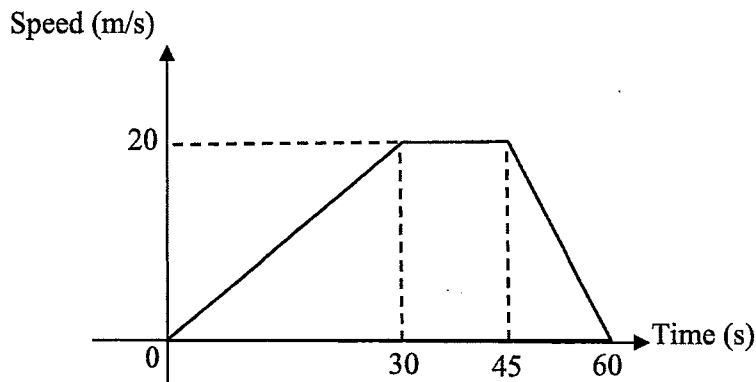
- (b) A closed cylinder has radius 30 cm and a height of 70 cm.



Calculate the total surface area of the cylinder.

[2]

- 6 The diagram shows the speed-time graph of a car's journey.



- (a) Find the deceleration of the car during the last 15 seconds. [1]
- (b) Find the total distance travelled for the journey. [2]
- (c) Calculate the average speed for the journey. [2]

- 7 (a) y is inversely proportional to x^2 .
 $y = 5$ when $x = 3$.

Find y when $x = 9$.

[2]

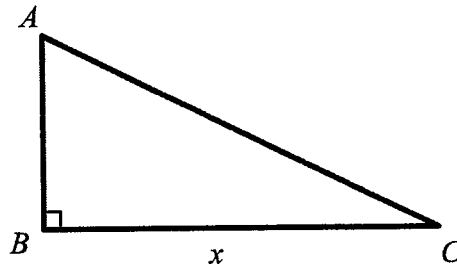
- (b) A map is drawn to a scale of 1 : 500 000.

- (i) Find the actual distance, in kilometres, represented by 8 centimetres on the map. [1]
(ii) A forest covers an area of 700 square kilometres.

Find, in square centimetres, the area representing the forest on the map.

[2]

-
- 8 The diagram shows a right-angled triangle ABC .
The length of BC is x centimetres.
 AB is 17 cm shorter than BC .
 AC is 1 cm longer than BC .



- (a) Write down the lengths of AB and AC in terms of x . [2]
(b) Form an equation in x and show that it simplifies to $x^2 - 36x + 288 = 0$. [3]
(c) Solve the equation $x^2 - 36x + 288 = 0$ and hence find the length of the longest side of the triangle. [3]
-

9 Answer the whole of this question on a single sheet of graph paper.

The table below is for $y = 1 + 2x^2 - x^3$.

x	-1	-0.5	0	0.5	1	1.5	2	2.5
y	4	1.6	1	p	2	2.1	1	-2.1

- (a) Calculate the value of p . [1]
- (b) Draw the graph of $y = 1 + 2x^2 - x^3$ for $-1 \leq x \leq 2.5$.
Use a scale of 4 cm to 1 unit on the horizontal x -axis and 2 cm to 1 unit on the vertical y -axis. [3]
- (c) By drawing a tangent, find the gradient of the curve at $x = -0.5$. [2]
- (d) Use your graph to find the values of x when $y = 1.5$. [2]
-

- 10 The table below shows the price plan offered by three telephone companies.

Plan	Telco A	Telco B	Telco C
Monthly Subscription	\$54	\$45	\$40
Talk Time	Unlimited	100 min	150 min
SMS	0	100	250
Data	8 GB	5GB	3GB

For example, a customer who signed a phone plan from Telco B is entitled to up to 100 minutes of Talk Time, 100 free SMS and up to 5GB of free data.

The excess charges below apply to customers who exceed their usage for that month, and the rates are the same for all the three telephone companies.

Type of Use	Excess Charges
Talk Time	\$0.16 per minute
SMS	\$0.05 per SMS
Data	0.0107 cents per KB

*1 GB = 10^6 KB

- (a) Mr Lim compares the price plan offered by the three telephone companies. He is entitled to 20% corporate discount off his total monthly bill if he signs the price plan from Telco A. On average, he uses 150 minutes of Talktime, 90 SMS and 4GB of data every month.

Calculate the total monthly bill, including 7% GST, for each of the price plan and suggest which company gives him the best value for money. [6]

- (b) Another telephone company offers the following discount on the monthly subscription if a customer signs multiple lines for their family:

Full monthly subscription fee for the 1st mobile line,
20% off for the monthly subscription fee for the second line,
25% off for the monthly subscription fee for the third line.

The company claimed that their customers can save 15% of their total monthly subscription if they sign three mobile lines.

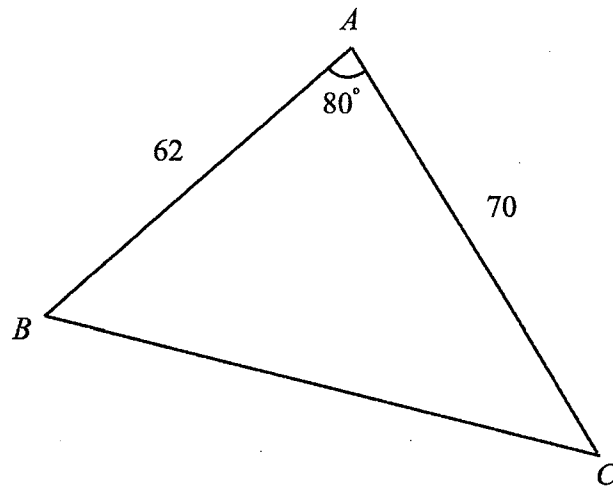
Is the claim justified?

Show the calculations in which you derive your conclusion. [2]

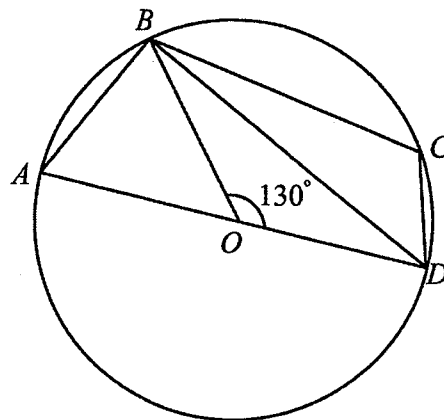
Section B (8 marks)

Answer **one** question from this section. Each question carries 8 marks.

- 11 (a) Three points, A , B and C , lie on a horizontal field.
 $\angle BAC = 80^\circ$, $AB = 62$ m and $AC = 70$ m.



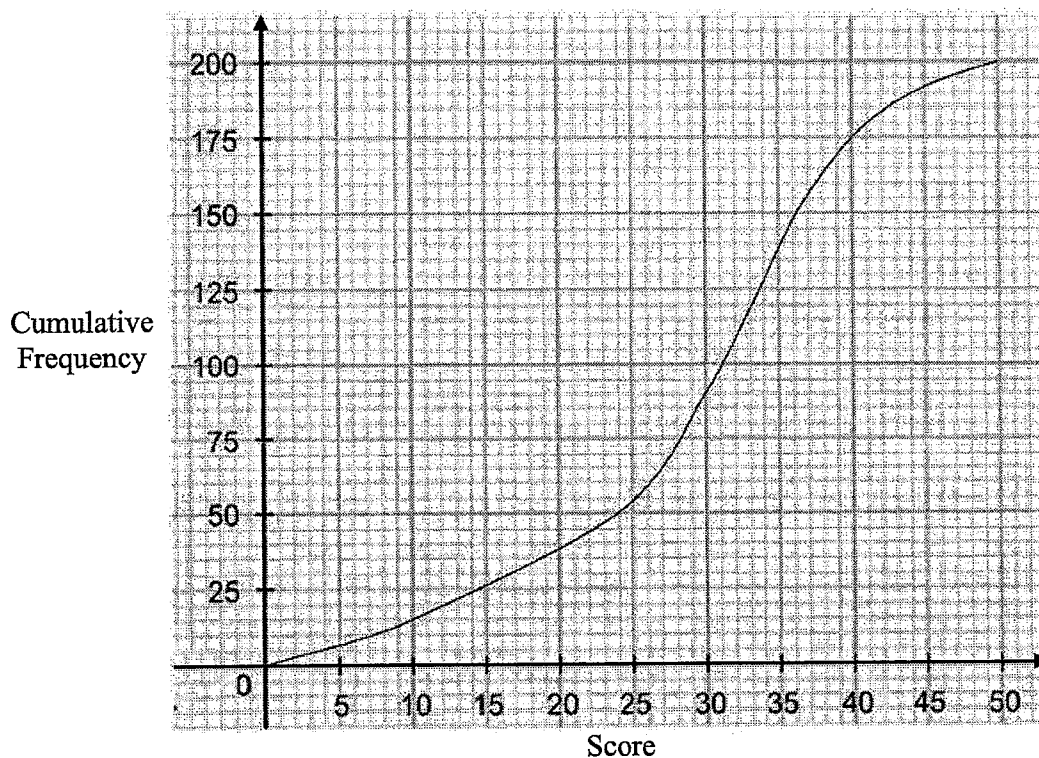
- (i) Find the length BC . [2]
 (ii) Find the area of triangle ABC . [2]
 (iii) Find the shortest distance from A to BC . [2]
- (b) In the diagram, the points A , B , C and D lie on a circle, centre O .
 AOD is a diameter and angle $BOD = 130^\circ$.



Find

- (i) angle OAB , [1]
 (ii) angle BCD . [1]

- 12 (a) The cumulative frequency graph below shows the scores of 200 students who took an English test.



- (i) Find the median score. [1]
 - (ii) Find the interquartile range of the scores. [2]
 - (iii) Find the number of the students who scored between 25 and 40 marks. [1]
 - (iv) Given that 70% of the students got at least x marks.
Find x . [1]
- (b) A bag contains 5 red balls and 3 green balls.
Two balls are drawn at random, one after the other, from the bag without replacement.
- Find, in its simplest form, the probability that
- (i) both balls are the same colour, [2]
 - (ii) both balls are different colours. [1]

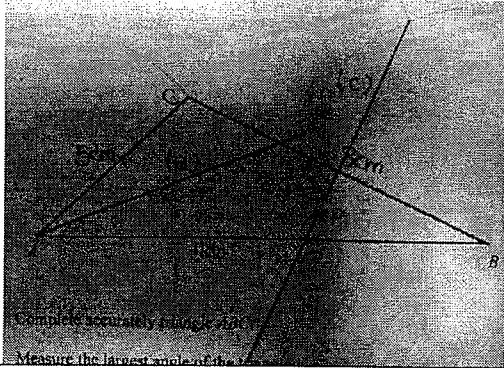
END OF PAPER 2

4NA 2018
Prelim Exam Paper 1
Marking Scheme

Q	Solution	Remarks
1	$\frac{30.16^2 - 24.96}{9.95} \approx \frac{30^2 - 20}{10}$ $= \frac{880}{10} = 88$	[M1] [A1]
2	420	[M1], [A1]
3(a)	338 000	[B1]
3(b)	2600 cm ²	[B1]
4	$x^2 - 3x + 2xy - 6y$ $= x(x-3) + 2y(x-3)$ $= (x+2y)(x-3)$	[M1] [A1]
5	$7 < 4x - 3 < 13$ $10 < 4x < 16$ $2.5 < x < 4$	[M1] [A1] or [B2]
6	$\sqrt[3]{ax+b} = k$ $ax+b = k^3$ $x = \frac{k^3 - b}{a}$	[M1]: cubed [A1]
7(a)	scale factor = 1.8	[B1]
7(b)	$AD = 2\frac{1}{3}$ cm or 2.33	[B1]
8(a)	$T_{32} = \frac{8(32)}{32+1} = 7\frac{25}{33}$ or 7.76	[B1]
8(b)	$26 = \frac{8n}{n+1}$ $26n + 26 = 8n$ $n = -1\frac{4}{9}$ Pattern number n must be a whole number.	[B1]
9	one feature: not all the 12 months were shown on the horizontal axis. Misleading: It is possible that there are high number of vandalism cases in those missing months.	[B1] [B1]
10(a)	$792 = 2^3 \times 3^2 \times 11$	[B1]
10(b)	$k = 363$	[B1]
10(c)	18	[B1]
11	Each interior angle in heptagon = 128.6 Each interior angle in pentagon = 108 $x = 360 - 128.6 - 108 = 123.4$	[M1] [M1] [A1]

12	$5x + 6y = 70$ $4x + 7y = 67$ $20x + 24y = 280$ $20x + 35y = 335$ Eq 4 – Eq 3 $11y = 55$ $y = 5$ $x = 8$ 3 adults and 5 children fee = $3(8) + 5(5) = \$49$.	[M1] [M1] [A1]
13(a)	Graph E	[B1]
13(b)	Graph A	[B1]
13(c)	Graph D	[B1]
14(a)	$x^2 - 4x + 2$ $= x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 + 2$ $= (x - 2)^2 - 2$	[M1] [A1]
14(b)	$(x - 2)^2 - 2 = 0$ $x - 2 = \pm\sqrt{2}$ $x = 3.41$ or $x = 0.59$	[M1] [A1]
15(a)	$(3x + 2)(x + 2)$	[B2]
15(b)	$\frac{(3x + 2)(x + 2)}{(x + 2)(x - 2)}$ $= \frac{3x + 2}{x - 2}$	[M1] [A1]
16(a)	$(x^{-4}y^3)^{-2}$ $= x^8y^{-6}$ $= \frac{x^8}{y^6}$	[M1] [A1]
16(b)	$\sqrt[5]{32x}$ $= (32x)^{\frac{1}{5}}$ $= 2x^{\frac{1}{5}}$	[M1] [A1]
17(a)	$165 + 5x = 360^\circ$ $x = 39^\circ$	[M1] [A1]
17(b)	$156^\circ \rightarrow 364$ $360^\circ \rightarrow 840$	[M1] [A1]
18(a)	$\frac{130 - 90}{90} \times 100$	[M1] [A1]

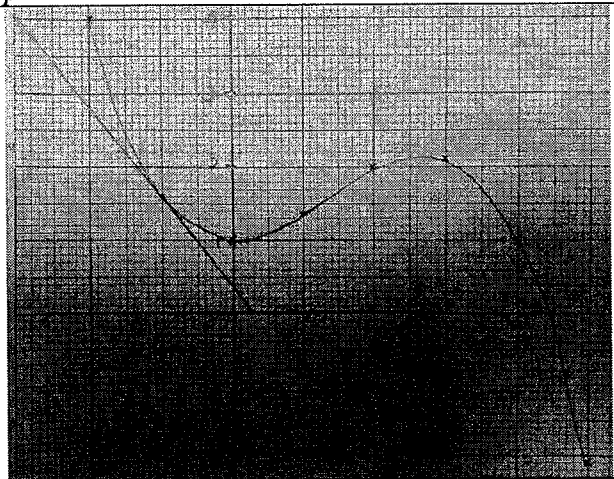
	$=44\frac{4}{9}\%$	
18(b)	85% $\rightarrow$ \$51 100% $\rightarrow$ \$60	[M1] [A1]
19(a)	$40 \leq v < 50$	[B1]
19(b)	Mean = $\frac{2930}{50}$ $=58.6$ km/h	[M1] [A1]
19(c)	Only grouped data were given. We do not have the individual speed for the 50 cars.	[B1]
20(a)	$180 - 65 - 59 = 56^\circ$	[B1]
20(b)	$180 - 65 = 115^\circ$	[B1]
20(c)	$180 - 70 - 59 = 51^\circ$	[B1]
20(d)	309°	[B1]
21(a)	$I = \frac{11400 \times 4 \times \frac{7}{12}}{100}$ $=\$266$	[M1] [A1]
21(b)	$(10\% \times 98500) + (60 \times 1800)$ $= \$117850$	[M1] [A1]
22(a)	$m = \frac{3-7}{11-8}$ $= -\frac{4}{3}$	[M1] [A1]
22(b)	$-1 = -\frac{4}{3}(4) + c$ $4\frac{1}{3} = c$ $y = -\frac{4}{3}x + 4\frac{1}{3}$	[M1] [A1]
22(c)	$\sqrt{(11-4)^2 + (3-(-1))^2}$ $=8.06$	[M1] [A1]
23(a)	Modal = 1 Median = 2 Mean = $\frac{6(1) + 5(2) + 4(3) + 4 + 6}{20}$ $=1.9$	[B1] [B1] [M1] [A1]
23(b)	25-8 $=17$	[M1] [A1]

24(acde)	 Complete accurately triangle ABC		
24(b)	114°		

4NA 2018
Prelim Exam Paper 2
Marking Scheme

Q	Solution	Remarks
1	$9447.84 = P \left(1 + \frac{8}{100} \right)^3$ $P = 7500$	[M1] [A1]
2(a)	2.48×10^3	[B1]
2(b)	$2.58 \times 10^{-10} \times 5 \times 10^9$ $= 1.29\text{g}$	[M1] [A1]
3(a)	$2(3x+7y) - 4(x-5y)$ $= 6x+14y - 4x+20y$ $= 2x+34y$	[M1] [A1]
3(b)	$\frac{3}{(x+2)^2} + \frac{4}{x+2}$ $= \frac{3+4(x+2)}{(x+2)^2}$ $= \frac{4x+11}{(x+2)^2}$	[M1] [A1]
4(ai)	$A = 132.1^\circ$	[B1]
4(aii)	$B = 130.5^\circ$	[B1]
4(bi)	$\tan BAC = \frac{8}{15}$	[B1]
4(bii)	$\cos ACD = -\frac{8}{17}$	[B1]
5(a)	Area of quadrant $= \frac{\pi(12)^2}{4} = 36\pi$ Area of semicircle $= \frac{\pi(6)^2}{2} = 18\pi$ Shaded region $= 36\pi - 18\pi = 18\pi \text{ cm}^2$	[M1] [M1] [A1]
5(b)	$\pi(30)^2 \times 2 + (2\pi \times 30)(70)$ $= 18849.6$ $= 18800 \text{ cm}^2 \text{ (3s.f.)}$	[M1] [A1]
6(a)	$\frac{4}{3}$	[B1]
6(b)	$\frac{1}{2}(60+15) \times 20$ $= 750 \text{ m}$	[M1] [A1]
6(c)	$\frac{750}{60}$ $= 12.5 \text{ m/s}$	[M1] [A1]

7(a)	$y = \frac{k}{x^2}$ $5 = \frac{k}{3^2}$ $k = 45$ $y = \frac{45}{9^2} = \frac{5}{9}$	[M1] [A1]
7(bi)	40km	[B1]
7(bii)	$1\text{cm}^2 : 25\text{km}^2$ $28\text{cm}^2 : 700\text{km}^2$ 28cm^2	[M1] [A1]
8(a)	$AB = x - 17$ $AC = x + 1$	[B1] [B1]
8(b)	$(x+1)^2 = x^2 + (x-17)^2$ $x^2 + 2x + 1 = x^2 + x^2 - 34x + 289$ $0 = x^2 - 36x + 288$ (shown)	[M1] [M1] [A1]
8(c)	$x = \frac{36 \pm \sqrt{(-36)^2 - 4(1)(288)}}{2(1)}$ $x = 24$ or $x = 12$ The longest side is 25 cm	[M1] [A1] [A1]

9(a)	$p=1.375$	[B1]
9(b)		Scale:1 Points:1 Curve:1
9(c)	Draw tangent $M = -2.42 \pm 0.1$	[M1] [A1] By differentiation: $m=-2.75$
9(d)	$x = -0.45 \pm 0.05$ or $x = 0.65 \pm 0.05$ or $x = 1.8 \pm 0.05$	All 3 values [B2] [B1]: at least one value with dotted line clearly shown.
10(a)	Telco A: $[54 + (90 \times \$0.05)] \times 1.07 \times 80\%$ $=\$50.08$ Telco B: $[45 + (50 \times 0.16)] \times 1.07$ $=\$56.71$ Telco C: $[40 + (1 \times 10^6 \times 0.0107 \times 0.01)] \times 1.07$ $=\$157.29$ Telco A gives the best value for money.	[B1]: 90SMS [B1]: 80% [B1]: 50 min [B1]: correct computation of excess data charges [B1]: GST for all three telco [B1]: Choose the lowest one (ecf allowed)

10(b)	Let the full subscription fee be x. 2nd line --- $0.8x$ 3rd line --- $0.75x$ Total savings = $3x - (x + 0.8x + 0.75x)$ $= 0.45x$ % savings = $\frac{0.45x}{3x} \times 100 = 15\%$ Therefore the claim is justified	[M1 o.e.] [A1]
11(ai)	$BC = \sqrt{62^2 + 70^2 - 2(62)(70)\cos 80}$ $BC = 85.069 = 85.1\text{m}$	[M1] [A1]
11(aii)	$\frac{1}{2}(62)(70)\sin(80)$ $= 2137.03 = 2140\text{ m}^2$	[M1] [A1]
11(aiii)	$2137.03 = \frac{1}{2} \times 85.069 \times h$ $h = 50.2$	[M1] [A1]
11(bi)	65°	[B1]
11(bii)	115°	[B1]
12(ai)	31	[B1]
12(aii)	$36 - 24$ $= 12$	[M1] [A1]
12(aiii)	$175 - 55 = 120$	[B1]
12(aiv)	26 marks	[B1]
12(ai)	$P(R,R) + P(G,G) = \left(\frac{5}{8} \times \frac{4}{7}\right) + \left(\frac{3}{8} \times \frac{2}{7}\right)$ $= \frac{13}{28}$	[M1] [A1]
12(aii)	$1 - \frac{13}{28} = \frac{15}{28}$	[B1]