NAME:		( )	CLASS:	

YISHUN TOWN SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018
SECONDARY 4 EXPRESS / 5 NORMAL ACADEMIC
MATHEMATICS PAPER 1 (4048/01)

DATE : 3 August 2018 **DAY : Friday**

DURATION : 2 h **MARKS: 80**

READ THESE INSTRUCTIONS FIRST

Do not turn over the cover page until you are told to do so.
Write your name, class and class index number on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid/ tape.
Write your answers on the writing papers provided.

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Answer **all** the 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.
Calculators should be used 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, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

80

This question paper consists of **20** printed pages including this cover page.

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Mathematical Formulae

Compound interest

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

Statistics

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

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

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Answer **all** the questions.

1 **(a)** Simplify $3-4(a-6)$.

Answer ..... [1]

(b) Factorise completely $2x^2-18$.

Answer ..... [1]

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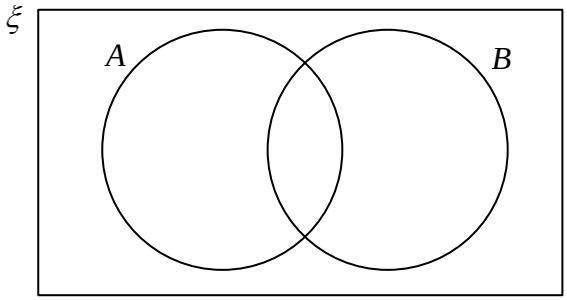
2 Factorise completely $6bd-9ad+3ac-2bc$.

Answer ..... [2]

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3 $\xi = \{\text{integers } x : 1 \le x \le 16\}$
$A = \{\text{factors of } 12\}$
$B = \{\text{prime numbers}\}$

(a) On the Venn diagram, shade the region which represents $A' \cap B$.



[1]

(b) List the elements in $A' \cap B$.

Answer ..... [1]

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4 If $(a-b)^2 = 19$ and $(a+b)^2 = 36$, find the value of $8ab$.

Answer ..... [2]

---

5 Kelly has 300 one-centimetre cubes.
She arranges all of the cubes into a cuboid.
The perimeter of the top of the cuboid is 18 cm.
Each side of the cuboid has a length greater than 3 cm.

Find the height of the cuboid.

Answer .....cm [2]

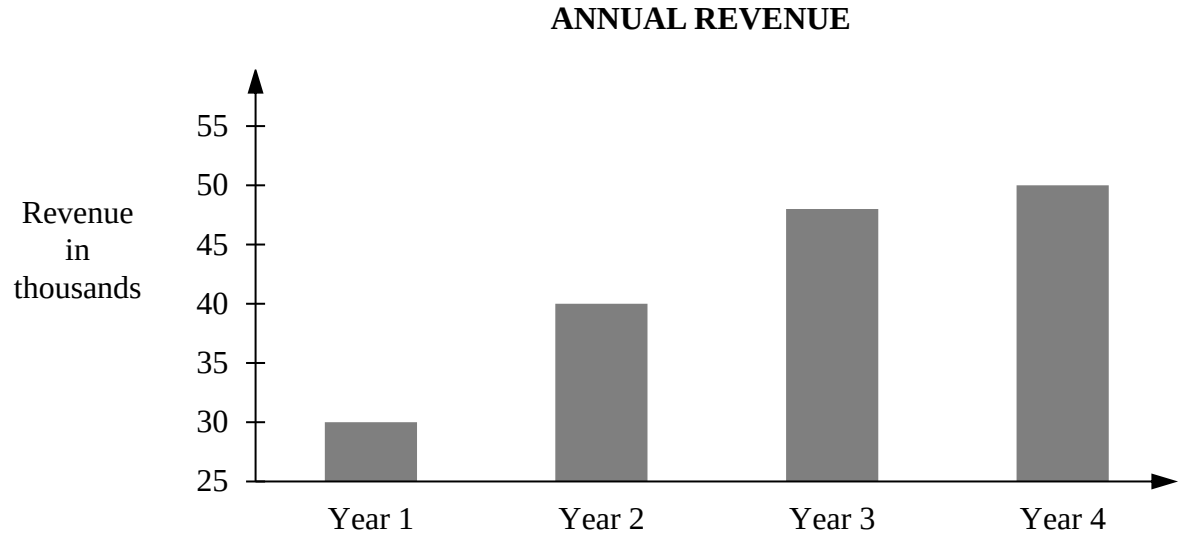
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6 Write as a single fraction in its simplest form $\frac{7}{(3x-1)^2} - \frac{5}{1-3x}$.

Answer ..... [2]

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7 The bar chart shows the revenue of a company in its first four years of operation.



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

Answer……

……

……[2]

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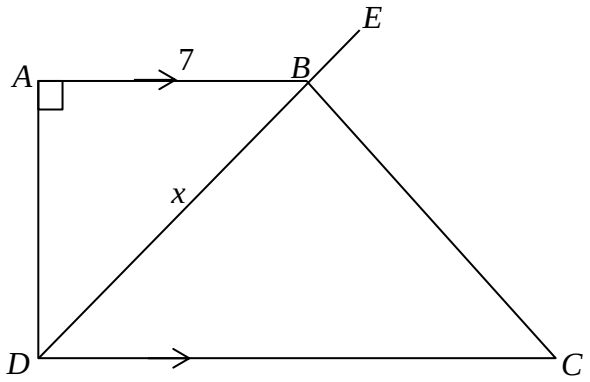
8 A quadratic graph cuts the x-axis at $x = -2$ and $x = 3$.
The quadratic graph also passes through a point with coordinates $(-3, 5)$.

Find the equation of the quadratic graph.

Answer ..... [2]

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9



ABCD is a trapezium.
Angle $BAD = 90°$.
DBE is a straight line.
AB = 7 cm and *DB* = *x* cm.

(a) Write down an expression, in terms of *x*, for $\cos A\hat{B}E$.

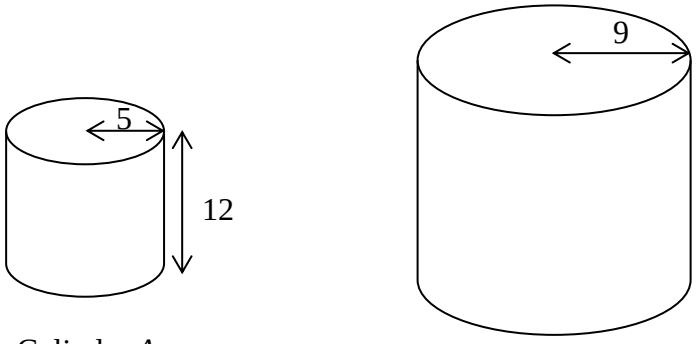
Answer $\cos A\hat{B}E =$ …….. [1]

(b) The area of the trapezium *ABCD* is 3 times the area of the triangle *ABD*.
Find the length of *DC*.

Answer ……cm [2]

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10



Cylinder *A* Cylinder *B*

The diagram shows two similar cylinders, Cylinder *A* and Cylinder *B*.
These cylinders are made with the same material.
The radius of Cylinder *A* is 5 cm and the radius of Cylinder *B* is 9 cm.
The height of Cylinder *A* is 12 cm.

(a) Find the height of Cylinder *B*.

Answer ……cm [1]

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(b) If the mass of Cylinder *A* is 250 g, find the mass of Cylinder *B*.

Answer ……...g [2]

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11 Peter plans to save $25 000 in a bank for 5 years.
The bank offers him two investment plans.

Plan A: The bank pays 5.5% simple interest per year for 5 years.
Plan B: The bank pays 5% interest compounded yearly for 5 years.

Which plan should Peter choose?
You must show your calculations.

Answer Peter should choose Plan ……because ……
……[3]

---

12 The safe speed, v m/s, at which a train can turn at a circular bend is directly proportional to the square root of the radius, r m of the circular bend. The safe speed of the train is 22 m/s when it turns a circular bend of radius 121 m.

(a) Calculate the safe speed for a circular bend of radius 81 m.

Answer .....m/s [2]

(b) Calculate the radius of the circular bend if the safe speed is 28 m/s.

Answer ……..m [1]

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13 **(a)** Express 462 as a product of its prime factors.

Answer ……...…….. [1]

(b) Written as a product of its prime factors, $1512 = 2^3 \times 3^3 \times 7$.

(i) Find the smallest whole number n for which 462n is a multiple of 1512.

Answer $n =$…… [1]

(ii) Explain why 1512 is not a perfect cube.

Answer ……

…… [1]

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14 A map of an airport has a scale of 1: 50 000.
The length of the airport runway on the map is 2.5 cm.

(a) Calculate the actual length, in metres, of the airport runway.

Answer …… m [2]

(b) The actual area of the airport is 3.75 km^2.
Calculate the area, in square centimetres, of the airport on the map.

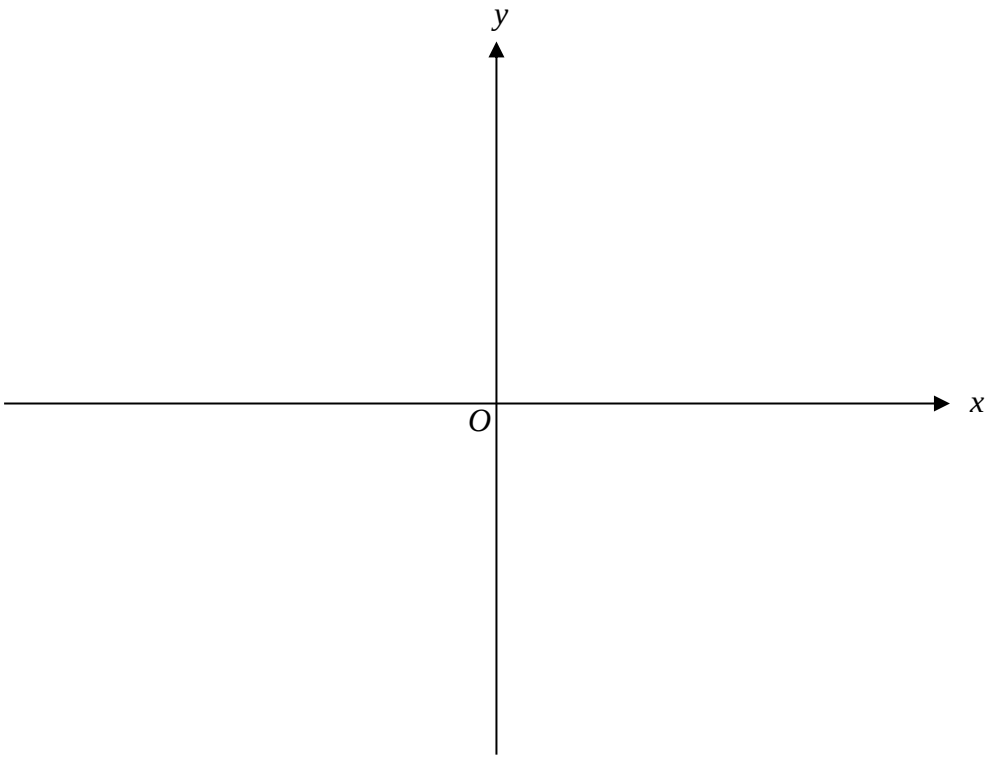
Answer …… cm^2 [2]

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15 **(a)** Express $x^2 - 4x - 7$ in the form $(x-p)^2 - q$.

Answer ..... [2]

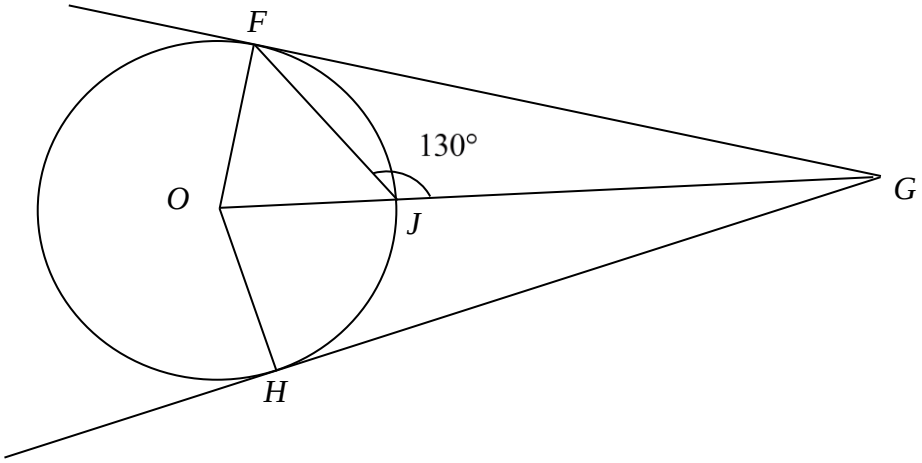
(b) **Sketch** the graph of $y = x^2 - 4x - 7$.
Indicate clearly the coordinates of the turning point and the points where the graph crosses the *x*- and *y*- axes.



[2]

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16



In the diagram, *FG* and *HG* are tangents to the circle with centre *O* and *OJG* is a straight line.
Angle *FJG* = 130°.

Show your working and give reasons.

(a) Find angle *JFG*.

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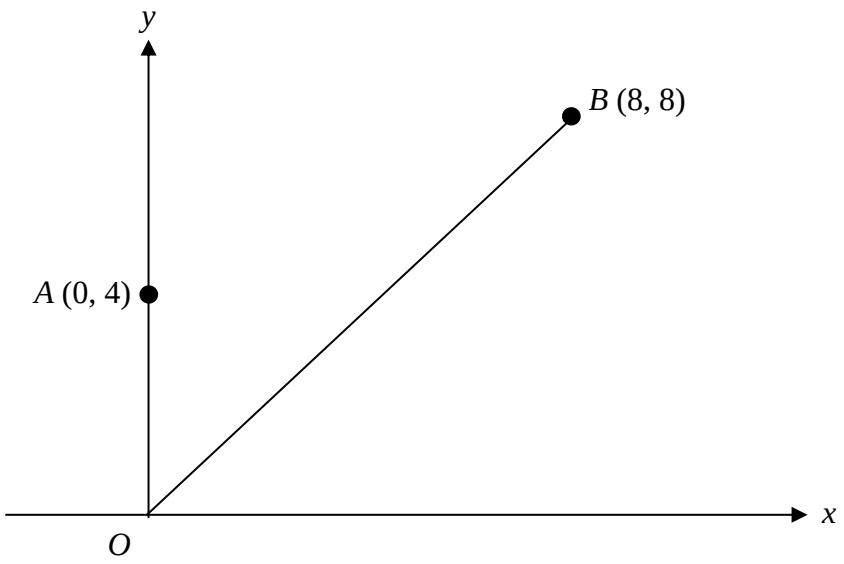
Answer .....……...…….° [3]

(b) Find angle *FGH*.

Answer .....……...…….° [2]

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17 A is the point (0, 4) and B is the point (8, 8).



(a) Find the equation of line AB.

Answer ……. [2]

(b) Given that $ABCO$ is a kite and AC is a diagonal of the kite, find the coordinates of point C.

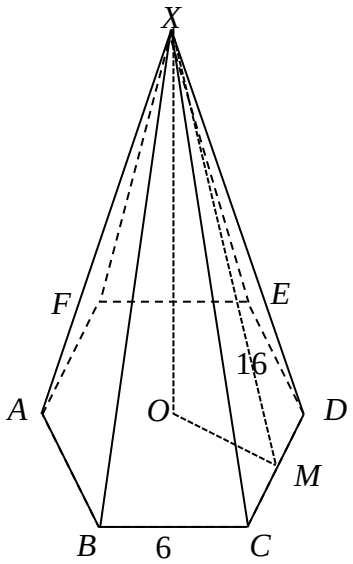
Answer (...…… , ……...……) [1]

(c) Find the area of kite $ABCO$.

Answer .....……..units^2 [2]

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18



A regular hexagon *ABCDEF* of sides 6 cm forms the base of a crystal pyramid.
M is the midpoint of *DC* and *O* is the centre of the hexagon.
The vertex, *X*, is directly above *O*.
The slant height, *MX*, of the pyramid is 16 cm.

(a) Find the height, *OX*, of the pyramid.

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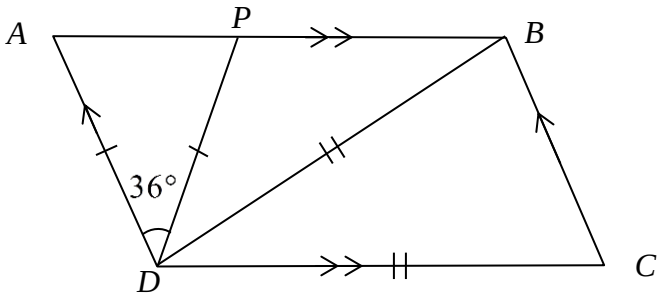
Answer $OX =$……..cm [2]

(b) The mass of 1 cubic centimetre of crystal is 3.2 grams.
The price of 1 gram of the crystal is $9.75.
Calculate the price of the crystal pyramid.
Give your answer to the nearest dollar.

Answer $……... [4]

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19



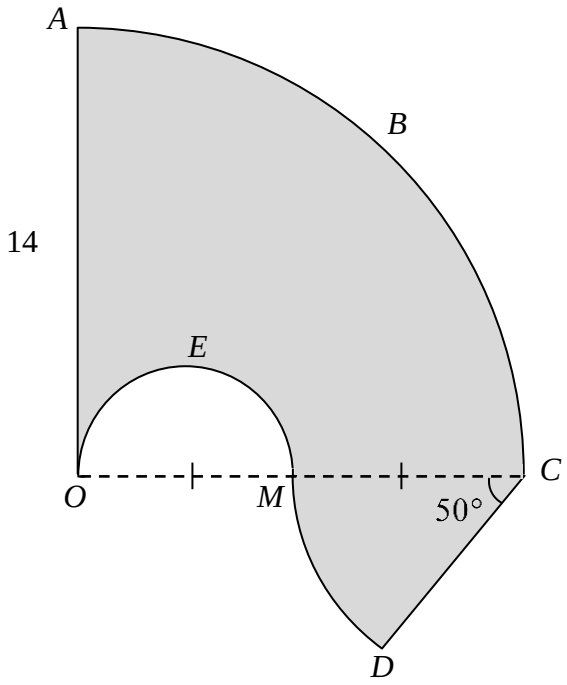
ABCD is a parallelogram with *DB* = *DC*.
P is a point on *AB* such that *DA* = *DP*.
Angle *ADP* = 36°.

Find angle *BDP*.
Give a reason for each step of your working.

Answer angle *BDP* =..... ° [4]

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20 The diagram shows a company logo *OABCDME* in which *OABC* is a quadrant of a circle, centre *O* and radius 14 cm. *M* is the midpoint of *OC* and a semicircle *OEM* is drawn with *OM* as diameter. *CDM* is a sector of a circle with centre *C*, radius *CM* and angle *DCM* = 50°.



(a) Find the length of arc *DM*.

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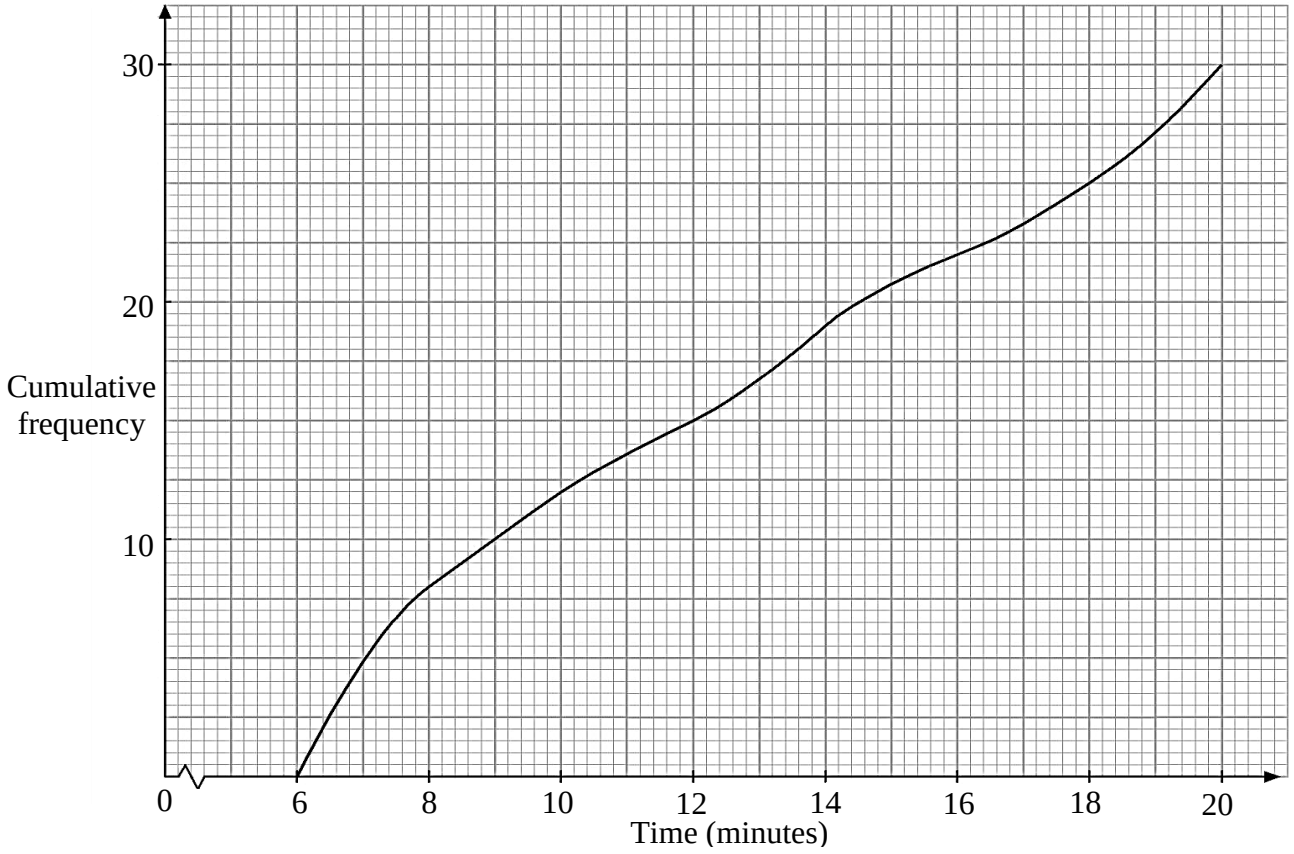
Answer *DM* =.....cm [1]

(b) Calculate the area of the logo *OABCDME*.

Answer …….. cm^2 [3]

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21 The times taken by 30 students in Class Alpha to run 2.4 km in their fitness test are recorded. The cumulative frequency curve below shows the distribution of their times.



(a) Use the curve to estimate the interquartile range of the times.

Answer ……..minutes [2]

(b) The maximum number of points a student can obtain in the test is 5 points.
The students who take less than 9 minutes to run 2.4 km are given 5 points for the test.
Find the probability that a student, chosen at random, receives less than 5 points.

Answer ……...……..... [1]

(c) The times taken by 30 students from Class Beta to run 2.4 km in their fitness test had the same median as Class Alpha's times but a higher interquartile range.

Describe how the cumulative frequency curve for Class Beta may differ from the curve for Class Alpha.

Answer ……

…… [1]

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22 XYZ is a triangular field.
XZ = 78 m. The bearing of Z from Y is 335°.





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(a) Construct a scale drawing of the field XYZ.
Use a scale of 1 cm to 10 m. [2]
The line XY has already been drawn.

(b) **(i)** Construct the perpendicular bisector of XZ. [1]

(ii) Construct the bisector of angle ZXY. [1]

(iii) The point A is nearer to X than to Z and nearer to YX than to ZX.
Shade the region where point A can possibly be. [1]

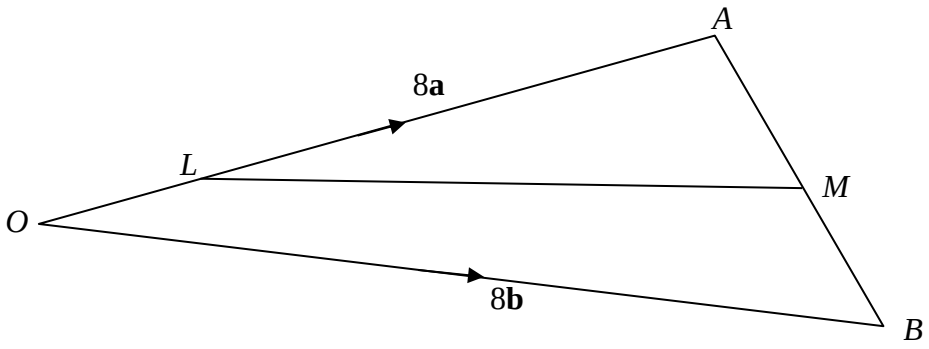
(c) An accident occurred at point Y.
An ambulance is travelling in a straight line along XZ.

Find the point along XZ where the distance between the ambulance and point Y is the shortest, and measure this actual distance.

Answer .....m [1]

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23



$\overrightarrow{OA} = 8\mathbf{a}$ and $\overrightarrow{OB} = 8\mathbf{b}$.
$\overrightarrow{OL} = \frac{1}{4}\overrightarrow{OA}$ and $BM = MA$.

(a) Write each of the following in terms of **a** and **b**.
Give your answers in their simplest form.

(i) $\overrightarrow{BM}$.

Answer ……...…….. [1]

(ii) $\overrightarrow{OM}$.

Answer ……...…….. [1]

(iii) $\overrightarrow{LM}$.

Answer ……...…….. [1]

(b) Find $\overrightarrow{OP}$ such that $\overrightarrow{LP} = 3\overrightarrow{LM}$.

Answer ……...…….. [1]

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(c) Explain why $\overrightarrow{OP}$ is not parallel to $\overrightarrow{OM}$.

Answer ……

…… [1]

(d) Find $\overrightarrow{ON}$ such that *LMBN* is a parallelogram.

Answer ……..…….. [2]

END OF PAPER

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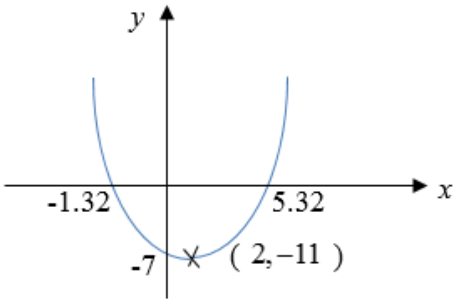
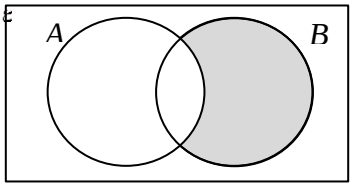
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YISHUN TOWN SECONDARY SCHOOL
2018 Prelim Examination
Secondary Four Express/ Five Normal
MATHEMATICS

Answer Scheme

Qn	Answer	Qn	Answer
1(a)	$27-4a$	15(a)	$(x-2)^2-11$
1(b)	$2(x-3)(x+3)$	15(b)	
2	$(3d-c)(2b-3a)$		
3(a)			
3(b)	$A' \cap B = \{5, 7, 11, 13\}$	16(a)	40°
4	34	16(b)	20°
5	15	17(a)	$y=\frac{1}{2}x+4$
6	$\frac{2+15x}{(3x-1)^2}$	17(b) 17(c)	C (4, 0) 32 units square
7	The vertical axis does not start from 0, making it seems that there are thrice the number of students who choose Year 2 than Year 1.	18(a) 18(b)	15.1 cm $14720
8	$y=\frac{5}{6}(x+2)(x-3)$	19	36°
9(a)	$\cos\angle ABE=-\frac{7}{x}$	20(a)	6.11 cm
9(b)	14	20(b)	156 cm^2
10(a)	21.6	21(a)	8.6
10(b)	1458 g	21(b)	2/3
11	Peter should choose Plan B because Plan B offers a higher interest/ amount of money at the end of 5 years.	21(c)	The curve will have wider spread with gentler gradient.
12(a)	18	23(a)(i)	4**a**- 4**b**
12(b)	196	23(a)(ii)	4**b**+4**a**
13(a)	$462=2\times3\times7\times11$	23(a)(iii)	2**a**+4**b**
13(b)(i))	36	23(b)	12**b**+8**a**
13(b)(ii)	The powers of 7 is not multiples of 3.	23(c)	$\overrightarrow{OM}$ is not a scalar multiple of $\overrightarrow{OP}$, hence OP is not parallel to OM.
14(a)	1250 m	23(d)	-2**a**+4**b**
14(b)	15 cm^2		

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YISHUN TOWN SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018
SECONDARY 4 EXPRESS / 5 NORMAL ACADEMIC
MATHEMATICS PAPER 2 (4048/02)

DATE : 14 Aug 2018 **DAY : Tues**

DURATION : 2 h 30 min **MARKS: 100**

ADDITIONAL MATERIALS

Writing Paper (8 sheets)
Mathematics Cover Sheet (1 sheet)
Graph Paper (1 sheet)

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The total number of marks for this paper is 100.

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Mathematical Formulae

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

Mensuration

Curved surface area of a cone = πrl

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

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

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

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

Arc length = $r\theta$, where θ is in radians

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

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

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

Statistics

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

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

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Answer **all** the questions.

1 **(a)** It is given that $p = \frac{4q^2}{3} + 5$.

(i) Find p when $q = -3$. [1]

(ii) Express q in terms of p. [2]

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

(c) Solve these simultaneous equations.

$$2x - 3y = 15$$
$$3x - 7y = 27.5$$ [3]

(d) Simplify $\frac{4(x-2)}{x^2-4} - \frac{2(3x-1)}{3x^2+5x-2}$. [3]

---

2 The total number of visitors who visited a newly opened Theme Park on weekdays and weekends is given by the table below.

	Categories		
	Child	Adult	Senior citizen
Weekdays	600	1500	400
Weekends	1600	3500	1000

(a) Represent the number of visitors in a 2×3 matrix **T**. [1]

(b) The admission tickets are priced at \$12 per child, \$20 per adult and \$16 per senior citizen.

Represent the prices of tickets in a 3×1 column matrix **P**. [1]

(c) Evaluate the matrix **R** = **TP**. [1]

(d) State what the elements of **R** represent. [1]

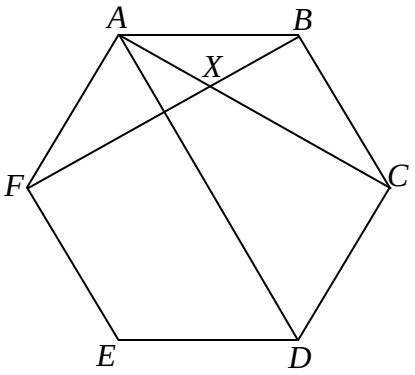
(e) The Theme Park decides to increase earnings by increasing the prices of all admission tickets by 35%.
This causes the total number of visitors in each category on both weekdays and weekends to drop by 20% due to the increase in prices.

Determine the difference in earnings and state whether it is an increase or decrease. [3]

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3 **(a)** Name a quadrilateral with four equal sides and unequal diagonals. [1]

(b) The diagram shows a regular hexagon *ABCDEF*.
The diagonals *FB* and *AC* intersect at point *X*.



(i) Find the interior angle of the regular hexagon *ABCDEF*. [1]

(ii) Explain why triangles *FAB* and *CBA* are congruent. [2]

(iii) Find obtuse angle *FXC*. [2]

(iv) Given that diagonal *AD* bisects angle *FAB*, determine if *FE* and *AD* are parallel. [2]

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4 The first four terms in a sequence of numbers are given below.

$$T_1 = 2^0 - 1^2 + 2^2 = 4$$
$$T_2 = 2^1 - 2^2 + 3^2 = 7$$
$$T_3 = 2^2 - 3^2 + 4^2 = 11$$
$$T_4 = 2^3 - 4^2 + 5^2 = 17$$

(a) Find T_5. [1]

(b) Show that the nth term of the sequence, T_n, is given by $2^{n-1} + 2n + 1$. [2]

(c) By first finding an expression for $T_{n+1} - T_n$, show that the difference between any 2 consecutive terms is always even for $n \geq 2$. [2]

(d) Find p if $T_{p+1} - T_p = 1026$. [2]

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

The variables x and y are connected by the equation

$$y = x^3 - 3x^2 + 2 .$$

Some corresponding values of x and y are given in the table below.

x	–2	–1	0	1	2	3	4
y	p	–2	2	0	–2	2	18

(a) Find the value of p. [1]

(b) Using a scale of 2 cm to represent 1 unit, draw a horizontal x-axis for $-2 \le x \le 4$.
Using a scale of 2 cm to represent 5 units, draw a vertical y-axis for $-20 \le y \le 20$.

On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) Use your graph to find the solutions to the equation $x^3 - 3x^2 = -2$ in the range $-2 \le x \le 4$. [2]

(d) By drawing a tangent, find the gradient of the curve at $(3, 2)$. [2]

(e) **(i)** On the same axes, draw the line with gradient 3 that passes through the point with coordinates (0, 1). [1]

(ii) Write down the equation of this line. [1]

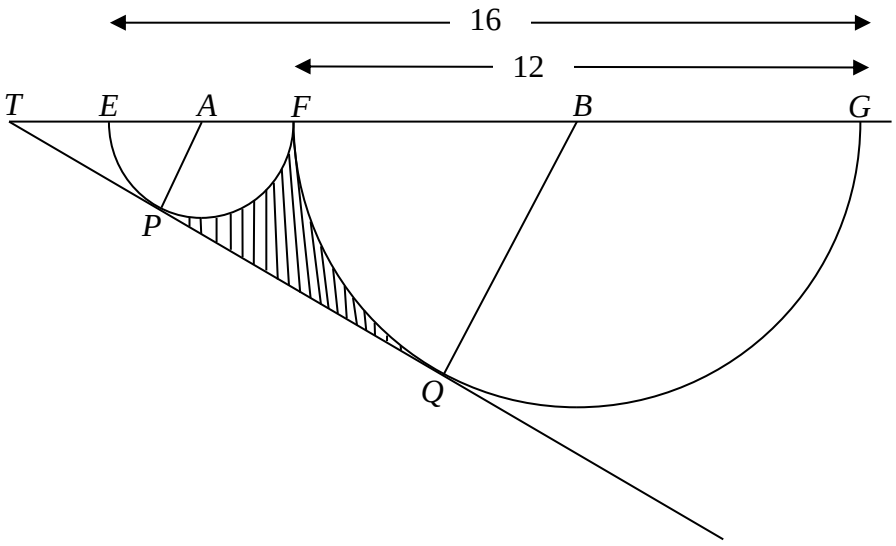
(iii) Write down the coordinates of the points where the line intersects the curve. [2]

(iv) These values of x are solutions of the equation $x^3 - 3x^2 + Ax + B = 0$.

Find the value of A and the value of B. [2]

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6



The diagram shows a smaller semicircle *EPF* with centre *A* and a larger semicircle *FQG* with centre *B*.
TPQ is a tangent to both the smaller and larger semicircle.
The points *T*, *E*, *A*, *F*, *B* and *G* lie on the same straight line.
GE = 16 cm and *GF* = 12 cm.

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(a) Show that triangles *ATP* and *BTQ* are similar.
Give a reason for each statement you make. [2]

(b) Show that *TE* = 2 cm. [2]

(c) Find the ratio of the area of triangle *ATP* to the area of quadrilateral *BAPQ*. [2]

(d) Calculate the area of the shaded region. [4]

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7 A tank has a capacity of 1080 litres.

(a) Tap *A* fills the tank at a rate of *x* litres per minute.

Write an expression, in terms of *x*, the time taken in minutes, by Tap *A* to fill up the tank completely. [1]

(b) Tap *B* fills the tank at a rate of 2 litres per minute slower than Tap *A*.

Write an expression, in terms of *x*, the time taken in minutes, by Tap *B* to fill up the tank completely. [1]

(c) The difference in time taken by Tap *A* and Tap *B* to fill the tank completely is 40 minutes 36 seconds.

Write down an equation in *x* to represent this information and show that it reduces to

$$203x^2 - 406x - 10800 = 0 .$$ [3]

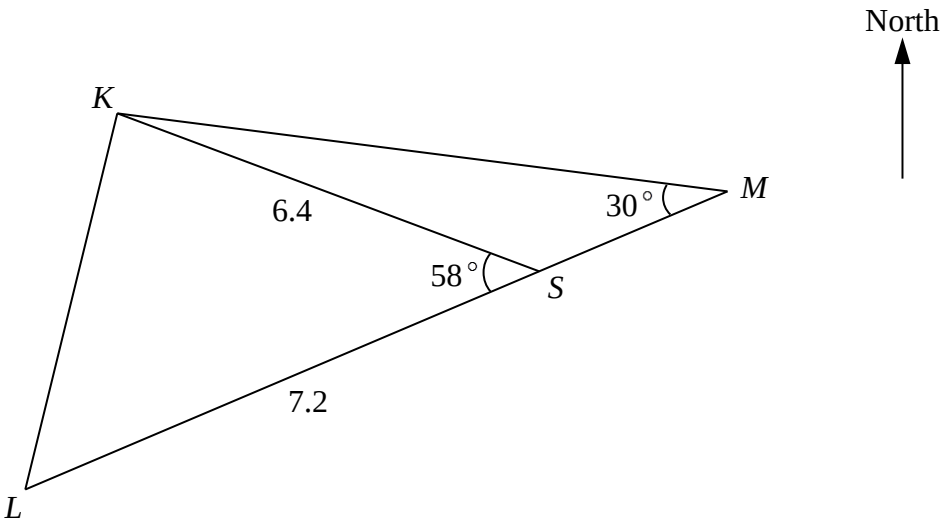
(d) Solve the equation $203x^2 - 406x - 10800 = 0$, giving your solutions correct to 2 decimal places. [3]

(e) Tap *A* and Tap *B* are turned on together to fill the tank when it is empty.

Find the time taken for the tank to be completely filled.
Give your answer in minutes and seconds, correct to the nearest second. [2]

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8



The diagram shows a triangular garden *KLM* on horizontal ground.
A sprinkler, *S*, lies on *LM*.
LS = 7.2 m, *KS* = 6.4 m, angle *KSL* = 58° and angle *KML* = 30°.

The bearing of *M* from *K* is 095°.

(a) Calculate the bearing of *L* from *M*. [2]

(b) Calculate *KL*. [3]

(c) Calculate *MS*. [3]

(d) Calculate the area of the triangular garden *KLM*. [2]

(e) A treehouse of height 3 metres stands at *K*.
Calculate the angle of depression of *S* when seen from the top of the treehouse. [2]

(f) The owner of the garden moves the sprinkler at *S* to *T* along *LM* such that *T* is nearest to *K*.
Find the distance *LT*. [2]

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9 **(a)** The table shows the ages of 50 staff in Company *A*. **[Turn over**

Age (x years)	Frequency
$20 \le x < 30$	15
$30 \le x < 40$	12
$40 \le x < 50$	10
$50 \le x < 60$	8
$60 \le x < 70$	5

(i) Calculate an estimate of the mean age. [1]

(ii) Calculate an estimate of the standard deviation. [1]

(iii) The standard deviation of the ages of 50 staff in Company *B* is 11 years.
Make one comparison between the ages of the staff in Company *A* and Company *B*. [1]

(b) 30 students sat for a Mathematics test.
The mean mark was 12.8 and the median mark was 12.
One student was late and sat for the test on the next day.
The new mean mark was 13.

(i) Calculate the marks scored by the student who was late. [2]

(ii) Copy and complete the sentence below with the correct phrase from the list.
The new median …

is definitely bigger than 12
is definitely smaller than 12
might be bigger than 12 but might still be 12
might be smaller than 12 but might still be 12
is still 12

[1]

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(c) There are some coloured cards in a bag.

The probability of drawing a red card is $\frac{1}{6}$ and that of drawing a green card is $\frac{1}{5}$.

5 points are awarded when a red card is drawn and 3 points are awarded when a green card is drawn. No points are awarded when other coloured cards are drawn.

After each card is drawn, it is then put back into the bag before the next card is drawn.

(i) Charles draws a card at random from the bag.

Find the probability that he will not be awarded any points. [1]

(ii) Charlene draws 2 cards at random from the bag.

Find the probability that she will be awarded less than 8 points. [2]

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10 Lim, Xian and Hui use smartphones as part of their everyday routine.
Lim and Xian sign up for the same mobile plan for 2 years as shown. **[Turn over**

Mobile Plan Contract Details (Bundled Plan and Extra Surcharges are subjected to 7% GST)			
Bundled Plan			
Phone Price	$1115	Local Free SMS	1000
Monthly Subscription	$42	Local Free Data Bundle	3GB
Local Free Voice Calls	200 mins		
One Time Registration Charge (not subjected to GST nor service charge)			$10.70
Extra Surcharges (Exceed Bundled Plan)			
Per global SMS	$0.15	Per local SMS	$0.0535
Excess local voice call usage billed per second			0.2675 cents/sec
Excess local mobile data charged at $10.70 per GB or part thereof* and final capped at $188.32 per month. Any additional charges on top of final capped amount will be $2.14 per MB. (1GB = 1000 MB) *For example, if user uses excess of 1.1GB, $21.40 will be charged.			

Lim bought a phone together with the bundled plan.

(a) How much does Lim need to pay in **total** for using the bundled plan for 2 years if he does not incur any extra surcharges? [2]

Xian sends 1100 local SMS, makes 205 minutes 40 seconds of local voice calls and uses 6.3GB of data locally in a particular month.

(b) How much **extra surcharge** does Xian need to pay in that month? [3]

Hui is looking for a new mobile plan contract and saw an advertisement from Eunonia Telecommunications Pte Ltd. The advertisement is on page 13.

Assume Hui's usage of SMS, calls, mobile data and global SMS is constant every month as shown below.

Local SMS: 500	Local Mobile Data: 8.5GB
Local Voice Calls: 980 minutes	Global SMS: 10

(c) Suggest the mobile plan that Hui should choose from Eunonia Telecommunications Pte Ltd. Justify the decision you make by showing your calculations clearly. [5]

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Eunonia Telecommunications Pte Ltd

With packages inclusive of 7% GST and discounts,





I can save more and use more!

Mobile Plan Name	XS	S	M
Monthly Subscription**	$48	$68	$88
Discount	30% off monthly subscription		
Local Free Mobile Data	3GB	4GB	5GB
DataJump***	Additional 3GB local data at $6/month!		
Super DataJump $10/month!***		+5GB local data!	+ 10GB local data!
Local Free Voice Calls (Mins)	200	400	Unlimited!
Local Free SMS/MMS**	100	$0.0535 per SMS	

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**Prices are based on the mobile plan featured. All prices are inclusive of 7% GST.
*** Optional and all prices quoted are inclusive of 7% GST.
Not allowed to combine DataJump and Super DataJump and/or multiple DataJumps and/or multiple SuperDataJumps.

Eunonia Telecommunications Pte Ltd Extra Surcharges (inclusive of 7% GST) (Exceed Bundled Plan)			
Per global SMS	$0.20	Per local SMS	$0.06
Excess local voice call usage billed per second			0.2675 cents/sec
Excess local mobile data charged at $10.70 per GB or part thereof* and final capped at $238 per month. Any additional charges on top of final capped amount will be 0.0107 cents per KB. (1MB = 1000 KB) *For example, if user uses excess of 1.1GB, $21.40 will be charged.			

End of Paper

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YISHUN TOWN SECONDARY SCHOOL
2018 Prelim Examination
Secondary 4E5N
MATHEMATICS Paper 1 and 2

Answer Key for Paper 2

Qn	Answer	Qn	Answer
1ai	$p = 17$	7a	$\frac{1080}{x}$ min
1aii	$q = \pm\sqrt{\frac{3p-15}{4}}$	7b	$\frac{1080}{x-2}$ min
1b	$x = -11.25$	7c	$203x^2 - 406x - 10800 = 0$ (shown)
1c	$x = 4.5$, $y = -2$	7d	$x = 8.36$ or -6.36 (2 d.p.)
1d	$\frac{2}{x+2}$	7e	73 min 21 seconds (nearest second)
2a	$\mathbf{T} = \begin{pmatrix} 600 & 1500 & 400 \\ 1600 & 3500 & 1000 \end{pmatrix}$	8a	245°
2b	$\mathbf{P} = \begin{pmatrix} 12 \\ 20 \\ 16 \end{pmatrix}$	8b	$KL = 6.63\,\text{m}$ (3 s.f.)
2c	$\mathbf{R} = \mathbf{TP} = \begin{pmatrix} 43600 \\ 105200 \end{pmatrix}$	8c	$MS = 6.01\,\text{m}$ (3 s.f.)
2d	The theme park earned \$ 43600 and \$105200 from the sale of admission tickets on weekdays and weekends respectively. or The amount of money collected by the theme park on weekdays and weekends respectively.	8d	$35.8\,\text{m}^2$ (3 s.f.)
2e	The Theme Park increases their earnings by \$11904.	8e	25.1°
3a	Rhombus	8f	$LT = 3.81\,\text{m}$ (3 s.f.)
3bi	120°	9ai	Mean age = 40.2 years old
3bii	By SAS Congruency Test, triangles *FAB* and *CBA* are congruent.	9aii	Standard deviation = 13.3 years old (3 s.f.)
3biii	$\angle FXC = 120°$	9aiii	Since the standard deviation by the Company *B* is lower, the age of Company *B* of 50 staff is more consistent than the Company *A*.

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3biv	Since Angle *FAD* + Angle *AFE* $=180°$, then sum of interior angles show that sides *EF* and *DA* are parallel.	9bi	19
4a	$T_5 = 2^4 - 5^2 + 6^2 = 27$	9bii	The new median might be bigger than 12 but might still be 12
4b	$T_n = 2^{n-1} + 2n + 1$	9ci	$\frac{19}{30}$
4c	$2(2^{n-1} + 1 - 2^{n-2})$	9cii	$\frac{163}{180}$
4d	$p = 11$	10a	\$2282. 31
6a	By AA Similarity Test, Triangle *ATP* and Triangle *BTQ* are similar.	10b	\$52.49 (2 d.p.)
6b	*TE* = 2 cm	10c	**Eunonia Telecommunications Pte Ltd** XS: \$222.89/month $\frac{70}{100}(\$48)$ + \$6 + 3(\$10.70) + 780(\$0.1605) + 10($\frac{20}{100}$) + 400(\$0.06) Mthly Sub Data Jump Extra Data Voice call G SMS Local SMS S: \$179.44/month $\frac{70}{100}(\$68)$ + \$10 + 580(\$0.1605) + 10($\frac{20}{100}$) + 500(\$0.0535) Mthly Sub S Data Jump Voice call G SMS Local SMS **M: \$100.35/month** $\frac{70}{100}(\$88)$ + \$10 + 10($\frac{20}{100}$) + 500(\$0.0535) Mthly Sub S Data Jump G SMS Local SMS I would suggest with **Plan M at \$100.35/month mobile plan** for him to suit his needs which is the **least cost per month**.
6c	The ratio area of triangle *ATP* : area of quadrilateral *BAPQ* is 1 : 8.		
6d	4.67 cm^2		

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