Final-Year Examination Specimen Paper 1

PART I (50 marks)
Duration: 1 hour

Marks Obtained
/ 100

1 Express 592 704 as a product of prime factors. Hence, find the value of $\sqrt[3]{592\ 704}$. [2]

2 Simplify $3(2x - 4) + \frac{2}{3}(3 - 6y) - (1 - x) - 2(y - x)$. [2]

3 Evaluate $3\frac{2}{5} - \sqrt{\frac{25 \times 49}{144}} \div 1\frac{3}{4}$. [2]

4 Estimate the value of $\frac{3.981 \div \sqrt{101.112}}{(-1.99)^2}$, giving your answer correct to 1 significant figure. [2]

5 (a) Express 234 915 cm correct to the nearest km. [1]

(b) Convert 0.019501 km^2 to ha, giving your answer correct to two significant figures. [2]

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6 Given that $a = -3$, $b = 4$ and $c = -1$, find the value of

(a) $b - a - c^3$, [1]

(b) $\frac{b}{2c} - a$, [1]

(c) $\sqrt{\frac{b}{3ac}}$. [2]

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7 If $4x + 12 > 4$ and $\frac{7}{2}y - 14 < 0$ such that x and y are integers, find

(a) the greatest value of $(y - x)$, [2]

(b) the least value of $\frac{x^2}{y}$. [2]

8 Deborah bought a dress at $59.40 after a value-added tax of 8% was imposed on it. How much more would she need to pay if the value-added tax were to increase to 10%? [3]

9 A contractor employs 5 men to paint 20 rooms. They take 4 days to complete the project by working 8 hours daily. He receives a project to paint 10 similar houses having 6 rooms each. How many more men must he employ so that he could complete the project in 5 days by working 12 hours daily? [4]

10 There are 12 families attending a family function. The ratio of the number of adults to the number of children is 2 : 3. If both the parents of the families are present, how many more children than the adults are there in the function? [4]

11 In the linear function $y = 2 - \frac{4}{5}x$, calculate

(a) the value of y when

(i) $x = -2$, [1]

(ii) $x = 3$, [1]

(b) the value of x when $y = 10$. [1]

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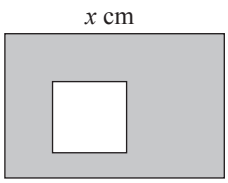
12 The figure below shows a rectangle and a square. The length of the rectangle is 4 cm longer than its width. The perimeter of the square is $\frac{3}{7}$ of the perimeter of the rectangle.



Find

(a) an expression for the perimeter of the shaded region, [3]

(b) the value of x if the perimeter of the shaded region is 40 cm, [2]

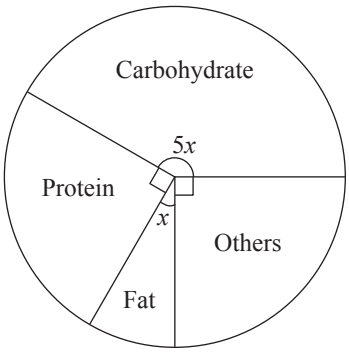
(c) the area of the shaded region. [2]

13 The proportions of nutrients taken by a family are shown in the pie chart below. Given that the family consumes 1.2 kg of carbohydrate more than the protein daily.

(a) Find the value of x. [2]

(b) What percentage of the nutrients taken is carbohydrate? [2]

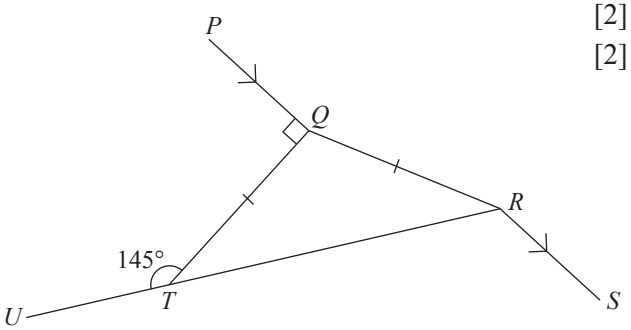
(c) Find the total mass, in kilograms, of the intake of nutrients by the family daily. [2]



14 In the diagram, UTR is a straight line and TQR is an isosceles triangle such that $QT = QR$. Given that PQ // RS, $\angle UTQ = 145°$ and $\angle PQT = 90°$, find

(a) $\angle TQR$, [2]

(b) $\angle TRS$. [2]



1 The table below shows the discounts given to customers for different amounts of purchases in a direct sale company.

Amount purchased (\$$x$)	$0 < x \leqslant 500$	$500 < x \leqslant 1000$	$x \geqslant 1000$
Discount (%)	5	7	10

(a) If Henry purchases items that worth \$870, how much can he save from the discounts given to him? [2]

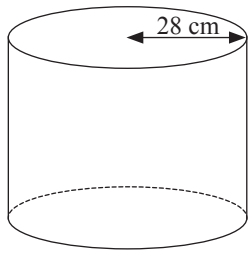
(b) Instead of purchasing \$870 in one short, he splits it into two purchases, \$450 and \$420. How much more will he need to pay? [2]

(c) Jeffrey paid \$994 for some items purchased from the company. What was the value of the items purchased before discount? [3]

2 (a) If $\frac{5y-2}{y} - 6 = 0$, find the value of $y^2 + 4$. [3]

(b) Solve the equation $\frac{3+z}{2} - \frac{4z-1}{3} + \frac{1}{6} = 0$. [3]

3 Water flows from a tap into an empty cylindrical tank of radius 28 cm at an average rate of 400 m*l* per second. The tap is turned off after 7 minutes and the tank is $\frac{5}{11}$ full with water.



Find

(a) the height of the tank, [3]

(b) the surface area of the tank that is in contact with water. [3]

The water from a cubic tank that is full of water is poured into the cylindrical tank. The water is just enough to fill the cylindrical tank.

(c) Find the length of the cubic tank, correct to 2 decimal places. [2]

(Take $\pi = \frac{22}{7}$)

4 In Jason's CPF account, the ratio of the amount of money he has in the ordinary account to that in the medisave account is 10 : 3. The ratio of the amount of money in the special account to that in the medisave account is 8 : 5. Given that he has $13 000 more in the ordinary account than in the special account, calculate

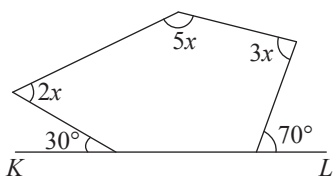
(a) the ratio of the amount of money in the ordinary account to that in the medisave account to that in the special account, [2]

(b) the amount of money he has in each account. [3]

Given that he had withdrawn 40% of the money in the ordinary account so far,

(c) how much money did he have in the ordinary account before the withdrawal? [2]

5 (a) A pentagon is shown as below. KL is a straight line.



(i) Find the value of x. [3]

(ii) Find its greatest exterior angle. [2]

(b) Each interior angle of an n-sided regular polygon is three times each of its exterior angle. Name the polygon. [3]

6 (a) Construct a triangle PQR such that $PQ = 8.5$ cm, $\angle RQP = 75°$ and $\angle RPQ = 60°$. [1]

(b) Construct a circle with centre R and diameter 9 cm. The circle cuts PR and QR at S and T respectively. Measure the length of ST. [2]

(c) Construct the perpendicular bisector of ST. [1]

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

(a) Using a scale of 1 cm to represent 1 unit on both axes, draw the graph of $y = 3 - 2x$. [2]

(b) The line $y = 3 - 2x$ passes through the point (a, a).
Using the graph, find the value of a. [1]

(c) Draw another linear graph of $y = 3x + 8$.
Find the point of intersection of the two lines. [2]

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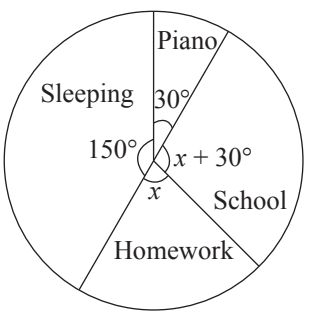

The pie chart shows the proportion of time Fiona spends on 4 activities in a day.
Find

(a) the value of x, [2]

(b) the number of hours Fiona spends on playing piano, [1]

(c) the percentage of the difference in the number of hours Fiona spends in the school and on doing homework. Give your answer correct to 2 significant figures. [2]

Final-Year Examination Specimen Paper 2

PART I (50 marks)
Duration: 1 hour

Marks Obtained
/ 100

1 (a) Express 0.04 as a fraction in its lowest terms. [1]

(b) Evaluate $0.281 \times 4.13 \div 0.074$, correct to

(i) 2 significant figures,

(ii) 3 decimal places. [2]

2 Evaluate $4 - 5 \times [3 - (-1) \times 2 \div 4 - 8]$. [2]

3 Evaluate $\frac{1}{2} - \frac{2 + \frac{3}{4}}{1 - \frac{5}{2}}$, giving your answer as a fraction in its lowest terms. [2]

4 (a) Express 2205 as a product of prime factors. [1]

(b) Hence, find the least value of n such that $2205n$ is divisible by 6 and 8. [2]

5 (a) Simplify $3 + \frac{m-1}{6} - \frac{2(m-2)}{5}$. [2]

(b) Factorise $\frac{1}{2}ab - \frac{3}{2}ac - 6c + 2b$. [2]

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6 Given that $\frac{2}{5}(x-2) - \frac{1}{3}(1+2x) = -3$, find the value of x^2. [3]

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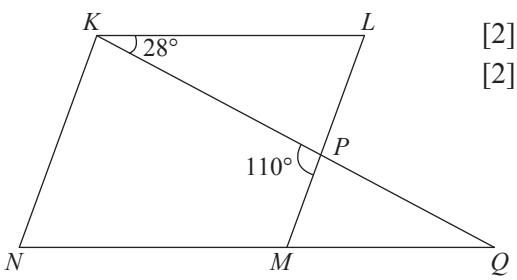
7 In the figure, $KLMN$ is a parallelogram and KPQ and NMQ are straight lines.
Find

(a) $\angle KNM$, [2]

(b) $\angle PQM$. [2]



8 Mr. Wong bought a refrigerator at a 15% discount during a sale. He paid $1273.30 for it after a GST of 7% imposed on it. How much money had he saved? [3]

9 There are 3 sectors, A, B and C, in a pie chart. If the ratio of the sectors is 4 : 6 : 5,

(a) find the sum of the angles representing sectors A and C, [2]

(b) what percentage of sector A is sector C? [2]

10 $\frac{2}{7}$ of the water in a bottle was transferred into a pail containing 0.5 *l* of water. There was 190 m*l* more of water in the bottle than in the pail. Find

(a) the amount of water, in *l*, that was transferred into the pail, [2]

(b) the ratio of the amount of water in the bottle to that in the pail at first. [2]

11 The denominator of a fraction is 4 more than its numerator. After adding 1 to a fraction, its numerator is 7 more than its denominator now.

(a) What is the original fraction? [2]

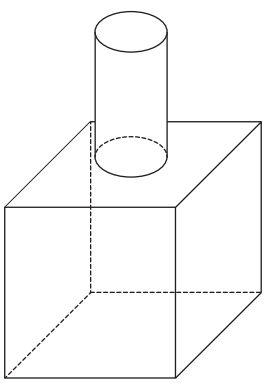
(b) Express the original fraction as a recurring decimal. [2]

12 A solid consists of a cylinder joined to a cube. The base radius of the cylinder is $\frac{1}{4}$ of the length of the cube. The total height of the solid is 13 cm. If the length of the cube is 6 cm, find

(a) the volume of the solid, [2]

(b) the total surface area of the solid. [3]

(Take $\pi = \frac{22}{7}$)



13 The table below shows the grades obtained by 40 pupils. $37\frac{1}{2}\%$ of the pupils obtained a grade less than 3.

Grade	1	2	3	4	5
Number of pupils	3	x	13	y	5

Find

(a) the values of x and y, [3]

(b) the angle representing grade 2 if the information above is illustrated using a pie chart. [1]

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14 A boy jogged around a circular field at an average speed of 1.2 m/s. He completed jogging three rounds along the field in 2 minutes.

(a) Calculate the perimeter of the field. [2]

(b) How much faster must he jog so that he can complete jogging the three rounds in 1 minute 30 seconds? [3]

PART II (50 marks)
Duration: 1 hour

1 (a) Simplify $\frac{3}{2} + 3t - \frac{4t - 5}{8t}$. [3]

(b) Solve the equation $\frac{1}{5}(2s - 1) - \frac{2}{3}(7 - s) + 6 = 0$. [3]

2 (a) The sum of Jane's and Fiona's ages is 35 years old. Jane will be twice as old as Fiona in t years' time. Write an expression, in terms of t, for the difference in their ages. [3]

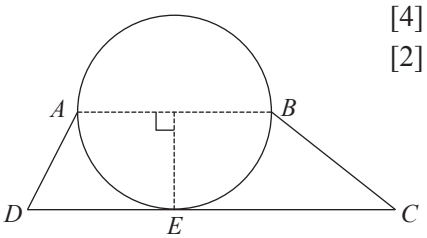
(b) Given that Jane will be 15 years older than Fiona in t years' time, find the value of t. [2]

3 In the diagram, AB is the diameter of the circle and AB // DC. Given that $\frac{11}{16}$ of the area of the figure is the circle and AB = 14 cm, find

(a) the length of DC, [4]

(b) the area of the figure. [2]

(Take $\pi = \frac{22}{7}$)

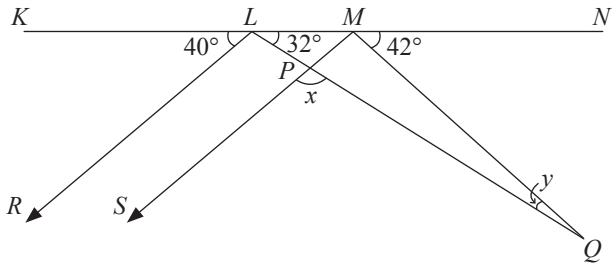


4 (a) Two of the exterior angles of an n-sided polygon are 46° and 58°. The remaining exterior angles are 32° each. Find the value of n. [3]

(b) In the diagram, $KLMN$ and LPQ are straight lines. Calculate the value of

(i) x, [2]

(ii) y. [2]



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5 (a) A line $y = 2 - 1.5x$ passes through the point $(n, 2n)$. Find the exact value of n. [2]

(b) Given that the point $\left(\frac{1}{2}, -4\right)$ lies on a line $y = 4x + k$, calculate

(i) the value of k, [2]

(ii) the value of y when $x = -3$. [2]

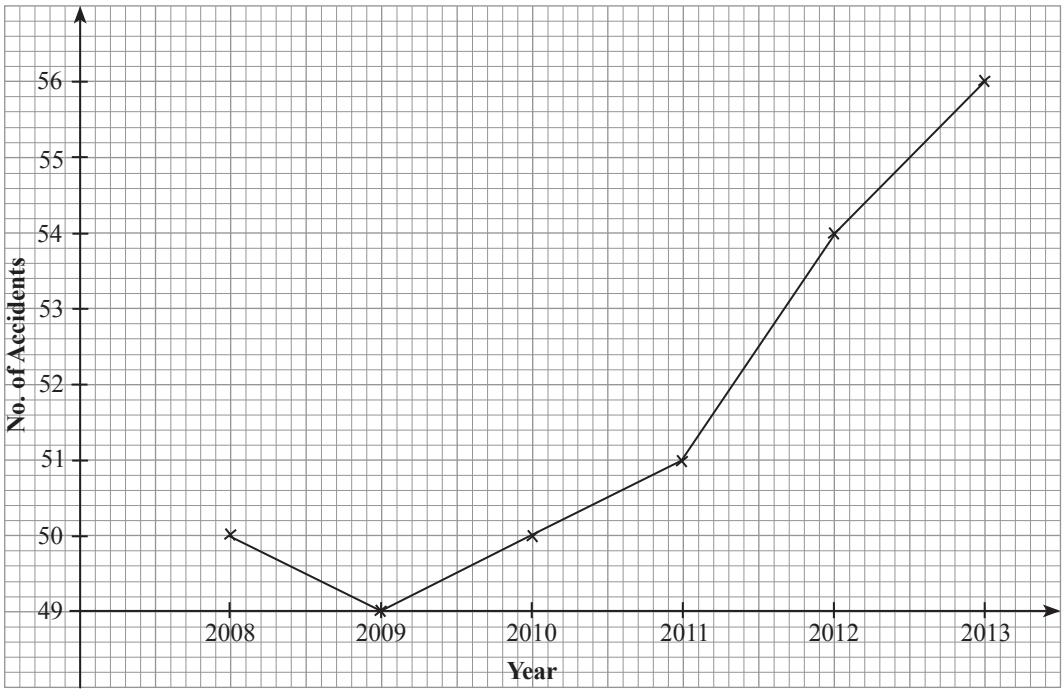
6 Construct the following in a single diagram:

(a) Construct a parallelogram $ABCD$ with $AB = 8$ cm, $BD = 12$ cm and $\angle ABD = 28°$. Measure the length of BC. [3]

(b) Construct the perpendicular from C to AD to cut AD at S. Measure the length of CS. [2]

(c) Hence, estimate the area of the parallelogram. [2]

7 The line graph in a poster shows the number of accidents caused by drivers who drink alcohol while driving in each year from 2008 to 2013.



(a) Find the percentage increase in accidents from 2008 to 2013. [2]

(b) In which year was the number of accidents the highest? [1]

(c) Why does the graph mislead the readers? [2]

(d) Suggest a purpose for representing the information this way. [1]

8 At 14 25, Kelly drove from home to Tampines at a constant speed of 90 km/h. After stopping for half an hour, she headed back home with a constant speed of 60 km/h. She reached home at 17 25.

(a) Find the total time taken for travelling in the car. [2]

(b) Find the distance between her house and Tampines. [3]

(c) At what speed must she drive so that she can reach Tampines 15 minutes earlier? [2]