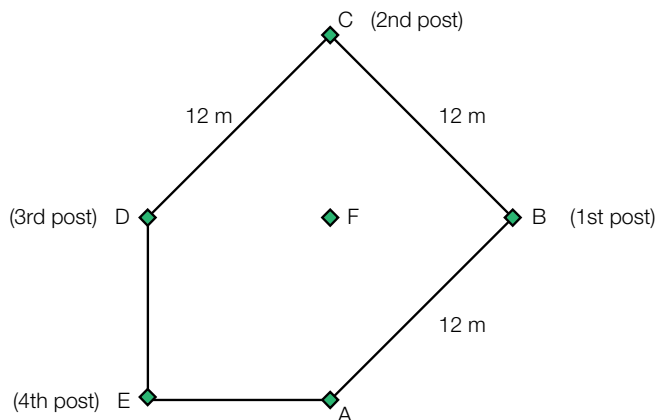


Sample PAPER 2

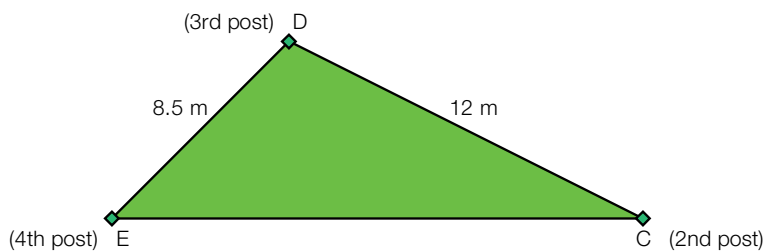
This paper contains 6 questions. The total number of marks is again 90, but the marks do not have to be evenly spread among the questions as in Paper 1.

1. The diagram below shows the outline of a rounders pitch. ABCD is a square of side 12 metres. \hat{AED} is a right angle. F is the intersection of the diagonals BD and AC and the diagonals **bisect** each other. AF is parallel to ED.



- (a) Show by calculation that AE is 8.5 m to 1 d.p. [2 marks]
- (b) Calculate:
- the size of angle \hat{CDF} . [2 marks]
 - the size of angle \hat{CDE} to the nearest degree. [1 mark]
- (c) What type of quadrilateral is shape AFDE? [1 mark]

The section of the pitch formed by triangle EDC is to be re-turfed.



- (d) Work out the perimeter of EDC. [3 marks]
- (e) Calculate the area of triangle EDC. [2 marks]
- The groundsman is ordering some turf for the pitch. To make allowance for wastage he needs to order 5% more than required. The turf costs £3.84 per square metre and is delivered in 1 m^2 rolls; delivery is free.
- (f) How many rolls of turf should the groundsman order? [2 marks]
- (g) Calculate the total amount to be paid for the turf. [2 marks]

[Total 15 marks]

2. The following table shows the source of text messages Tanya has received on her new phone.

Source (sender)	Parents	Siblings	Friends and others
Number of messages	31	147	322

Tanya's sister accidentally deleted one of the text messages.

(a) Calculate the probability that the deleted message:

(i) was sent by a sibling [2 marks]

(ii) did not come from a parent [1 mark]

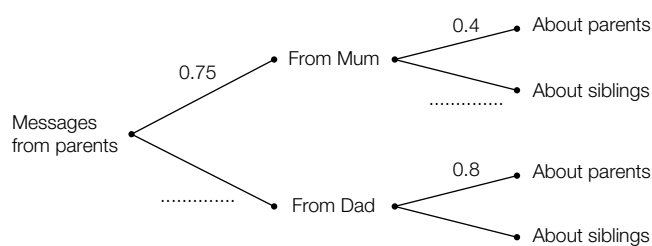
(iii) did not come from a sibling given that it was not sent by a parent. [2 marks]

At the end of the first week of using her new phone, Tanya had received 100 messages.

(b) Estimate the number of text messages that came from friends and others. [2 marks]

Text messages that Tanya receives from her parents contain news about themselves (mum and dad) or about Tanya's siblings.

(c) Complete the following tree diagram.



[2 marks]

Tanya receives a new message from her parents.

(d) Calculate the probability that the message:

(i) is from her mum and about her siblings [2 marks]

(ii) is about her parents. [2 marks]

(e) Given that the message is about her parents, calculate the probability that it came from her dad. [3 marks]

[Total 16 marks]

3. The advertising director of a telecommunications company has collected data from branches of his company in nine different countries. The data shows the sales of products (y) in millions of dollars and the corresponding amount spent on advertising (x), also in millions of dollars.

Advertising cost (x)	3.4	2.2	1.3	3.2	3	2.6	2.6	2.2	1.7
Sales (y)	25.2	19.9	18.7	24.7	21.9	23.1	22.8	20.1	19.9

(a) Use your GDC to find:

(i) \bar{x} , the mean advertising cost [2 marks]

(ii) \bar{y} , the mean sales figure. [2 marks]

(b) Draw a scatter diagram to illustrate the data. Use a scale of 2 cm to represent \$1 million on the x -axis and 1 cm to represent \$5 million on the y -axis. [4 marks]

(c) Plot the point $P(\bar{x}, \bar{y})$ on your scatter diagram. [1 mark]

(d) Describe the correlation between sales and advertising costs. [1 mark]

(e) Use your GDC to find:

- (i) the product moment correlation coefficient, r [1 mark]
- (ii) the equation of the regression line of y on x . [2 marks]

(f) Use your equation of the regression line to estimate:

- (i) the estimated sales figures when the advertising costs amount to \$2 million [2 marks]
- (ii) the advertising cost when the projected value of sales is \$21 million. [3 marks]

[Total 18 marks]

4. The average attendance at basketball league matches was found to be normally distributed with a mean of 17 500 and a standard deviation of 1600.

(a) With the aid of sketches, calculate the probability that one of the matches would have an attendance:

- (i) higher than 19 500 [2 marks]
- (ii) not more than 15 000 [2 marks]
- (iii) between 16 000 and 18 000 [2 marks]

(b) Given that there were 40 matches played one weekend, find the number of matches with an estimated attendance above 19 500. [1 mark]

(c) A match is graded as 'well attended' if the attendance is ranked in the top 15%. Work out the minimum attendance of the 'well attended' matches. [2 marks]

[Total 9 marks]

5. The number of overseas students admitted to a university in the year 2001 was 300. In 2011, admissions of overseas students had risen to 740.

Assume that the number of admissions of overseas students at the university increased every year, forming an arithmetic sequence such that $u_1 = 300$ and $u_{11} = 740$.

(a) Find the yearly increase in admissions of overseas students. [3 marks]

(b) Work out the total number of overseas students admitted to the university between 2001 and 2011 (inclusive). [3 marks]

Mr Fonseca, the director of admissions, believes that the number of admissions of overseas students formed a geometric rather than an arithmetic sequence. Answer the following questions using the same information from above but assuming that the sequence is geometric.

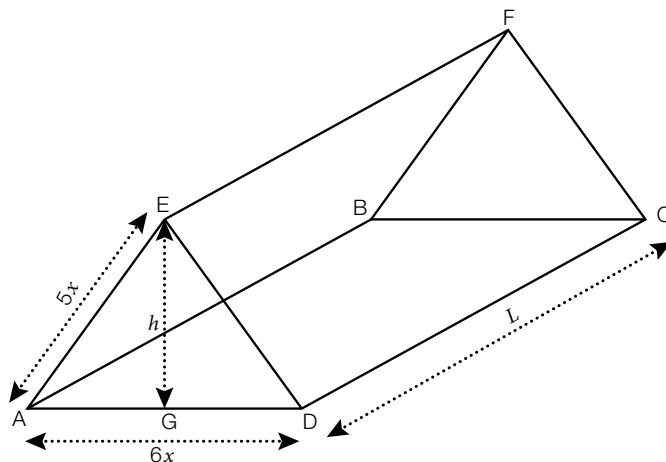
(c) Find the common ratio. [4 marks]

(d) Work out the number of overseas students admitted in 2005. [2 marks]

(e) Calculate the total number of admissions from 2005 to 2011 inclusive. [3 marks]

[Total 15 marks]

6. The company Camp-Perfect is designing a new tent made of canvas. The tent will be in the form of a triangular prism.



ADE is an isosceles triangle with sides $5x$, $5x$ and $6x$ metres. The length of the tent is L metres and the vertical height is h metres.

- (a) Show that the height h of the tent can be written in terms of x as $h = 4x$. [2 marks]
- (b) Calculate the cross-sectional area of the tent (the area of triangle ADE) in terms of x . [2 marks]

The volume of the tent is 18 m^3 .

- (c) Show that $x^2 L = \frac{3}{2}$. [3 marks]

The canvas will cover the four sides of the tent excluding the floor.

- (d) Show that the total surface area of the tent, A , can be written as $A = 24x^2 + \frac{15}{x}$. [3 marks]
- (e) Differentiate A to find $\frac{dA}{dx}$. [3 marks]
- (f) Find the value of x that minimizes the surface area. [2 marks]
- (g) Calculate the minimum area of canvas needed to make the tent. [2 marks]

[Total 17 marks]