Mathematics Olevel
Moderated paper 1

01. A walnut cake is cylindrical in shape and has a radius if 12cm and a thickness of 5 cm.

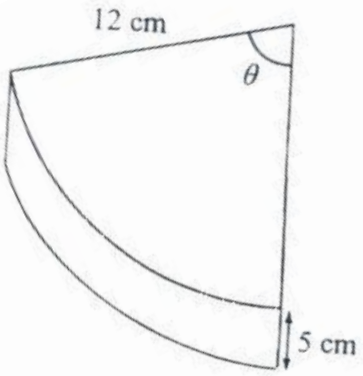
(a) 15% of the mass of the cake is lost through evaporation during the baking process. Given that the final mass of the cake is 2.1kg, calculate the mass of the cake before it was baked.

(b) The cake is cut into 6 equal pieces with the cross – section of each piece being a sector of a circle, as shown in the figure. Find, in terms of π,

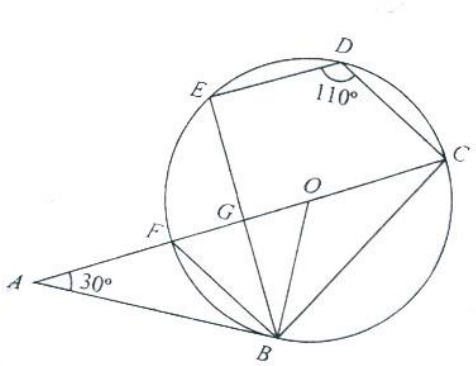
(i) The value of θ in radians,

(ii) The volume, in cm^3, of each piece of cake,

(iii) The total surface area, in cm^2, of each piece of cake.



02. In the diagram O is the centre of circle, AFOC and EGB are straight lines and AB is a tangent to the circle.



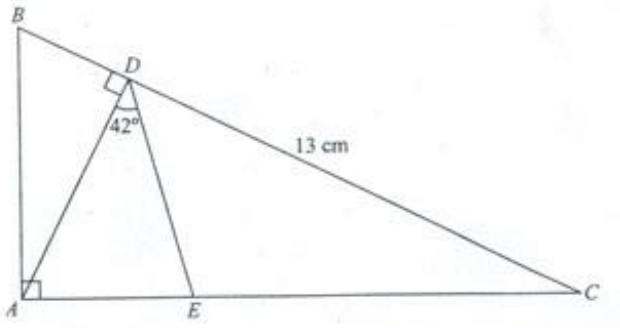
(a) Given that ∠ BAC = 30^0 and ∠ EDC = 110^0 , calculate

(i) ∠AOB,

(ii) ∠EBO,

(b) Explain why triangle ABO is Similar to triangle CBF.

03. In the diagram, BC = 13 cm, AB = 7 cm, ∠ADE = 42^0, ∠BAC = 90^0 and D is the foot of perpendicular from A to BC.



Calculate

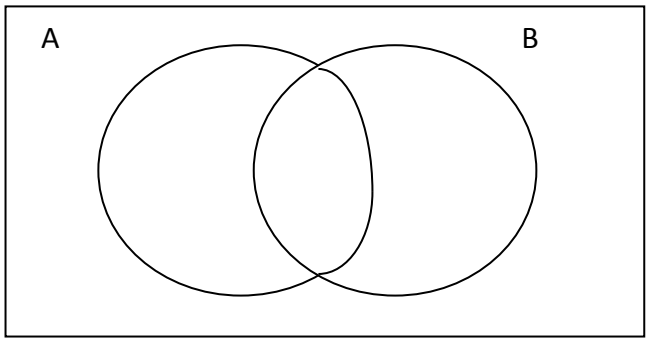
(a) The length of AC,

(b) The length of AD,

(c) ∠DAC

(d) The length of AE

04. (a) Copy the Venn diagram and insert a largest possible set C such that A ∩ C = C and B ∩ C = ϕ.



(b) If ε denotes the set of all positive integers less than 50, A denotes the set of all positive integers less than 50 that are multiples of 3, and B denotes the set of all positive integers less than 50 than are multiples of 5,

(i) State the main property of the elements of set A ∩ B and find n(A ∩ B)

(ii) Suggest what set C in (a) could represent and list down all the elements contained in C,

(iii) Shade on the diagram the set A ∩ C`.

(c) Draw a new Venn diagram of the three sets X,Y and Z such that X ∩ Y ≠ ∅ and (X ∪ Y) ⊂ Z

05. (a) With reference to the origin O, the position vectors of the points A,B and C are $\begin{pmatrix} a \\ 2 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 4 \end{pmatrix}$ and $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$ respectively, where a is a constant.

(i) Evaluate ¼ BC + OB.

(ii) The length of OA is Equal to $\sqrt{5a}$.Without any calculation or working , Write down an observation about the constant a

(iii) Given that OA is parallel to OB, determine the value of a.

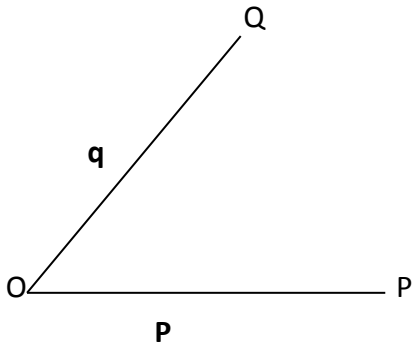
(b) The diagram shows three points P, Q and O with OP =**p** and OQ = **q.**copy the diagram, mark and clearly label the points X,Y and Z such that

(i) OX = **q** – 3**p**

(ii) OY = **p** + 3/2 **q**,

(iii) OZ = **p** + **q**

(c) State the shape of the figure OQZP.



06. (a) the table below shows the revised taxi fares charged by a particular taxi company.

Flag down	2.80 for the first km
1 km to 10 km	0.20 per 380 m
Above 10 km	0.15 for every 300 m
Waiting time	0.20 for every 45 s
Peak period premium	35% of the metered fare
Booking fee	3.20

Paige booked a taxi during peak period. the waiting time was 10 min. The total distance travelled was 16.4km. Calculate her taxi fare the whole journey, correct to the neatest 5 cents.

(b) The cash price of a computer is 2799.A buyer is allowed to buy the computer by paying a deposit of 15% followed by 12 equal monthly instalments of 250.

(i) Calculate the hire purchase price.

(ii) Calculate the percentage interest on the outstanding balance under this hire purchase scheme.

07. Sally has 5 red and black blouses, and 10 skirts of which 4 are black and 6 are brown, In her wardrobe. Every morning, she will select a blouse and a skirt for work at the random.

(a) Draw a relevant probability that sally will select a blouse and a skirt of the same colour.

(b) Calculate the probability that sally will select a blouse and a skirt of the same colour.

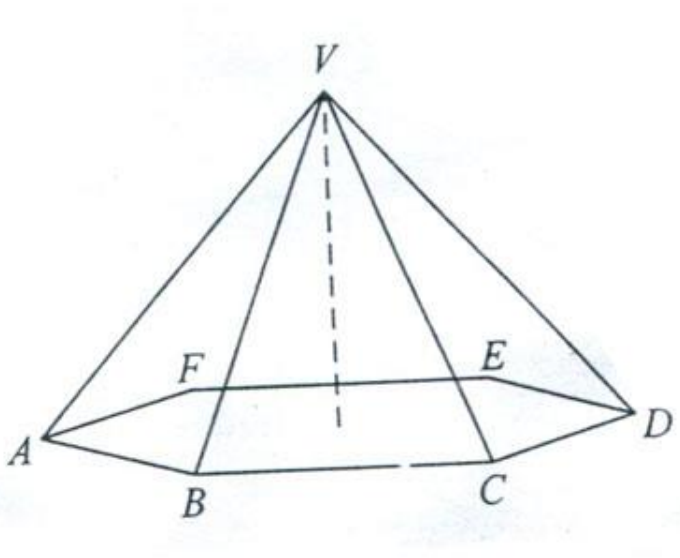
(c) Calculate the probability that she will select a blouse and a skirt of different colour.

(d) Calculate the probability that she will wear a red blouse and brown skirt.

(e) One day, sally felt that black blouse and brown skirt is a bad combination. Assuming that she will only be buying red blouses, calculate the the number

of red blouses she needs to buy so that the occurrence of selecting this combination is reduced to 8%.

08. The diagram shows aright pyramid with a horizontal regular hexagonal base ABCDEF And vertex V.



(a) Find the size of each interior angle of the hexagonal base.

(b) The volume of the pyramid is 45 $\sqrt{3}$ cm^3 and the area of the base is 54 $\sqrt{3}$ cm^2

(i) Calculate the height of the pyramid.

(ii) Find the length of each side of the hexagonal base.

(iii) Calculate, in cm^2, the total surface area of the pyramid, giving your answer correct to three decimal places.

09. the number of hours spent by a group of 51 people in company A doing exercise in the month of September is recorded in the following frequency table.

Number Of hours, x	$0 \leq x \leq 10$	$10 < x \leq 20$	$20 < x \leq 30$	$30 < x \leq 40$	$40 < x \leq 50$	$50 < x \leq 60$
Frequency	2	3	6	15	18	7

(a) Using a horizontal scale of 2 cm to represent 10 hours and vertical scale of 2 cm to represent 10 people, draw a cumulative frequency curve to illustrate this distribution.

(b) Use your plotted curve to estimate the median number of hours and the interquartile range.

(c) estimate the fraction of the total number of people spending 44 hours or more doing exercise.

10. (a) Copy and complete the following table of values for the graph of $y = 2x + \frac{1}{X} - 5$.

X	0.1	0.2	0.5	1	1.5	2	2.5	3	4
Y		0.4		-2					3.25

(b) Using a scale of 2 cm to represent 1 unit on both axes, draw the graph of $Y = 2x + \frac{1}{X} - 5$ for $0.1 \leq x \leq 4$.

(c) Use your graph to find

(i) The coordinates of the minimum point,

(ii) The gradient of the cure at the point x = 2 by drawing a suitable straight line,

(iii) The range of values of x for which y is greater than2,

(iv) The solutions of the equation $2x + \frac{1}{x} = 5$.

(v) The solutions of the equation $3x + \frac{1}{x} - 6 = 0$ by drawing a suitable straight line.