Z a h i r a C o l l e g e

Mid year Vacation Assignment 2014

Medium : English	Grade: 10 C
Subject : Mathematics	
Adm. No :	Name :

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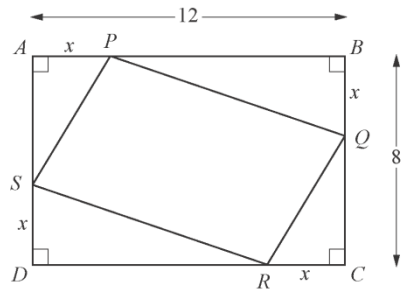
1)



In the diagram, *ABCD* is a rectangle.
AB = 12 cm and *BC* = 8 cm.
AP = *BQ* = *CR* = *DS* = *x* cm.
(a) Find an expression, in terms of x, for
(i) the length of *QC*,
(ii) the area of triangle *CRQ*.
(b) Hence show that the area, in square cm, of the quadrilateral *PQRS* is $2x^2 - 20x + 96$
.
(c) When the area of quadrilateral *PQRS* is 60 cm^2, form an equation in *x* and show that it simplifies to $x^2 - 10x + 18 = 0$.

2)

(a) It is given that $S = \frac{n(a+l)}{2}$
(i) Find the value of *S* when *n* = 20, *a* = -5 and *l* = 17.
(ii) Express *l* in terms of *S*, *n* and *a*.
(b) Solve the equations
(i) $5t^2 = 12$
(ii) $\frac{y-1}{8} = \frac{2}{y-1}$
(c) Factorise $y^2 - 6xy + 5x^2$

3)

a) Fifty students were asked how many books they each took to school on Monday.
The results are summarised in the table below.

Number of books	0	1	2	3	4	5	6	7
Frequency	10	11	8	3	6	7	4	1

(i) Write down the median.
(ii) Calculate the mean number of books.
(iii) What is the probability that two students, chosen at random, both took 5 books to school?
Give your answer as a fraction in its simplest form.

b) The fifty students were also asked how long they each took to travel to school. The results are summarised in the table below

Time of travel (t minutes)	$4 \leqslant t < 6$	$6 \leqslant t < 8$	$8 \leqslant t < 10$	$10 \leqslant t < 12$
Frequency	21	11	13	5

1) Draw a histogram to illustrate the above data.
2) Find number of students those who took more than 8 minutes.

4)

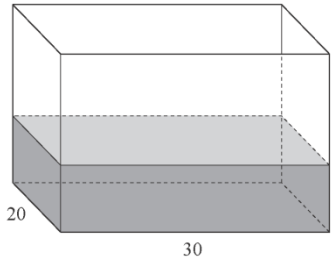
a)The numbers of goals scored in 20 football matches were

5 0 5 4 1 0 5 5 1 3
4 5 0 0 5 5 3 2 5 4

(i) Complete the table in the answer space.
(ii) State the median.
(iii) Calculate the mean number of goals.

Number of goals		Frequency
0		
1		
2		
3		
4		
5		

(b)



The diagram shows an open rectangular tank with base 20 cm by 30 cm. The tank contains 9600 cm^3 of water.

(i) State the number of liters of water in the tank.
(ii) Calculate the depth of the water.
(iii) Calculate the total surface area of the tank that is in contact with the water.
(iv) The water had entered the tank through a circular pipe of radius 0.8 cm.
It flowed through the pipe at 25 cm per second. How long did the 9600 cm^3 of water take to enter the tank? Give your answer correct to the nearest second.

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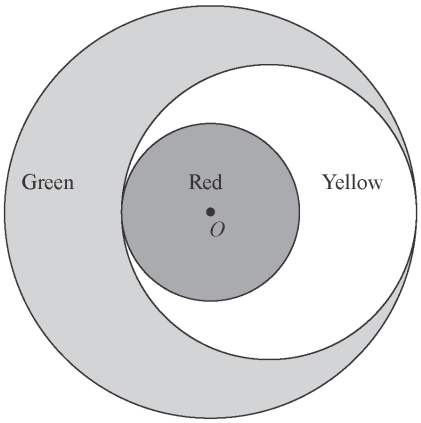
05)



The diagram shows the design of a company symbol. It consists of three circles.
The smallest circle has centre *O* and radius 2x cm.
The largest circle has centre *O* and radius 2y cm.
The third circle touches both the other two circles as shown.
The three regions formed are coloured red, yellow and green as shown.
(a) Explain fully why the radius of the third circle is (x + y) cm. |
(b) Write down, in terms of n, *x* and y, expressions for the area of the region that is coloured
(i) yellow,
(ii) green.
(c) The area of the green region is twice the area of the yellow region.
Use this information to write down an equation involving *x* and *y*, and show that it simplifies to
$y^2 - 6xy + 5x^2 = 0$. |
(d)Solve the equation $y^2 - 6xy + 5x^2 = 0$, expressing *y* in terms of x.
(e)Calculate the fraction of the design that is coloured yellow.

06)

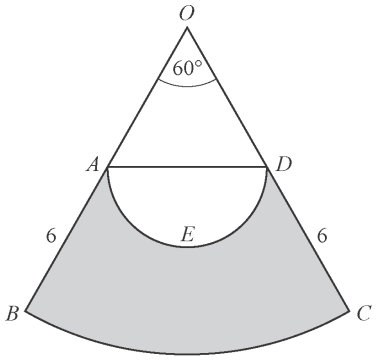
A piece of wire, 28 cm in length, is cut into two parts. One part is used to make a rectangle and the other a square.
The length of the rectangle is three times its width. The width of the rectangle is *x* cm.

(a) (i) Write down an expression, in terms of x, for the length of the rectangle.

(ii) Find, and simplify, an expression, in terms of x, for the length of a side of the square.
(b) It is given that the area of the rectangle is equal to the area of the square.

(i) Form an equation in *x* and show that it reduces to $x^2 - 28x + 49 = 0$.

07)



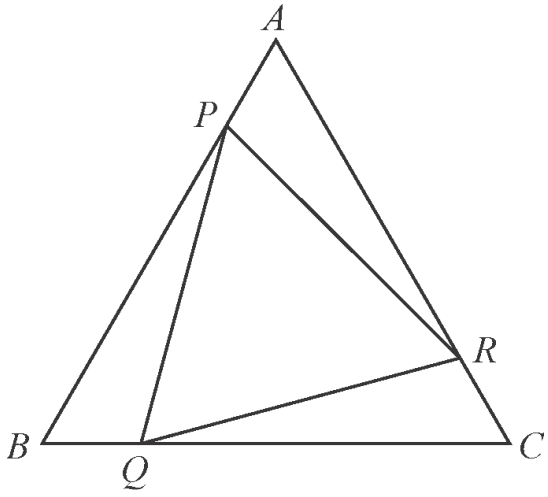
In the diagram, *OBC* is the sector of a circle, centre O, and *BOC* = 60°.
A and *D* are the midpoints of *OB* and *OC* respectively, and *AB* = *DC* = 6 cm.
AED is a semicircle with *AD* as diameter.

(a) Show that *AD* = 6 cm.

(b)) The length of the arc *BC* is **nπ** centimetres.
(i) Find n
(ii) Find $\frac{\text{the length of the arc } AED}{\text{the length of the arc } BC}$

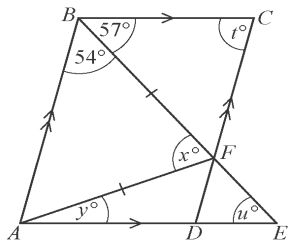
(c) (i) Find the area of the sector *BOC*
*(iii)*Hence find the area of the shaded region..

08)(a)



In the diagram, *ABC* is an equilateral triangle.
The points P, *Q* and *R* lie on AB, *BC* and *CA* respectively, such that *AP* = *BQ* = CR. **(i)** Show that triangles *APR, BQP* and *CRQ* are congruent.

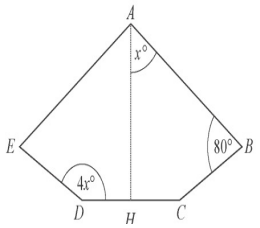
1. In the diagram, *ABCD* is a parallelogram. *ADE* and *BFE* are straight lines.*AF* = BF.<*ABF* = 54° and <*CBF* = 57°.
   Find the value of
   (i) *t,*
   (ii) *u,*
   (iii) *x*,
   (iv) *y*.



2. Calculate the value of an interior angle of a regular 10-sided polygon

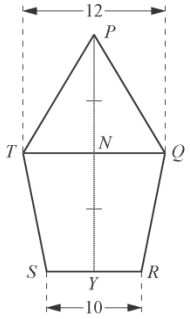
3. *AH* is the line of symmetry of the pentagon *ABCDE*. ∠*HAB* = x°, ∠*ABC* = 80° and ∠*EDH* = 4x°. Find *x*.

(b)

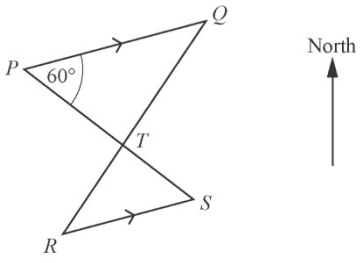


4. *PY* is the line of symmetry of the pentagon *PQRST*. *PY* and *TQ* intersect at N. *PN* = NY. *TQ* = 12 cm and *SR* = 10 cm.
   (i) Given that *PY* = 2h cm, find an expression, in terms of h, for the area of the trapezium *QRST*.
   (ii) Given that the area of *PQRST* is 221 cm^2, calculate *h*.

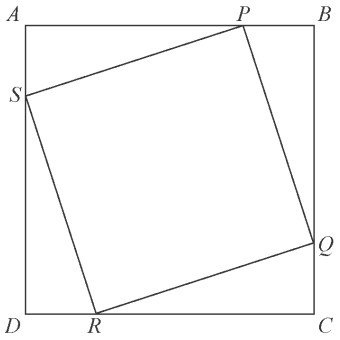
(c)



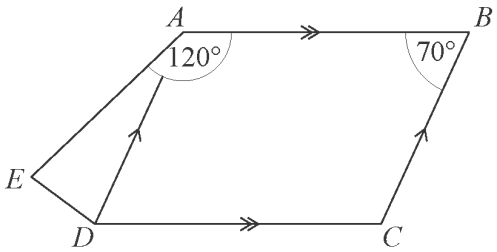
5.
   a) P, Q, *R* and *S* are four points on level ground. *PQ* is parallel to *RS* and ∠*QPS* = 60°. *PS* and *RQ* intersect at *T*. Write down the value of ∠*PSR*. Give a reason for your answer.
   b) The bearing of *Q* from *P* is 070°. Find the bearing of
      (i) *S* from P
      (ii) *P* from S
      (iii)*R* from *S*



6. In the diagram, *ABCD* is a square. Points P, Q, *R* and *S* lie on AB, BC, *CD* and *DA* so that *AP* = *BQ* = *CR* = DS. Giving all your reasons, show that
   (i) *PB* = QC,
   (ii) Δ *BPQ* is congruent to Δ *CQR,*
   (iii) ∠*PQR* is a right angle.
   (iv) Write down two reasons to show that *PQRS* is a square

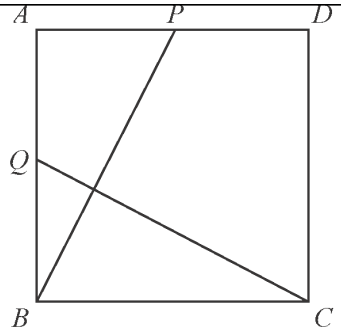


7. The parallelogram *ABCD* forms part of a pentagon *ABCDE*. ∠*ABC* = 70° and ∠*BAE* = 120°.
   (i) Find **(i)**∠ *BCD,* **(ii)**∠EAD
   (ii) .Prove ∠EDC is twice ∠*AED*.
   (iii) Find∠ AED,∠ *EDA*.



8. In Diagram I, *ABCD* is a square. *P* and *Q* are the midpoints of *AD* and *AB* respectively. Show that ∆les *APB* and *BQC* are congruent.

Diagram I



9. In Diagram II, *QC* and *PB* intersect at M. ∠*BMC* = 90°. State your reasons clearly.

Diagram II