Mathematics
Paper 2
FORM 4
14 June 2018
Session 1

TIME: 2 hours **TOTAL: 100 marks**

Examiner: Miss M. Eastes **Moderator: Mrs.D. Algie**

Name and Surname:

Teacher:

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTIONS.

- This question paper consists of 17 pages. Formulae are given on page 15.
  Please check that your question paper is complete.
- Answer all questions on this question paper.
- Read and answer all questions carefully.
- It is in your own interest to write legibly and to present your work neatly.
- All necessary working which you have used in determining your answers **must** be clearly shown.
- Approved non-programmable calculators may be used except where otherwise stated. Where necessary give answers correct to **2 decimal places** unless otherwise stated.
- Ensure that your calculator is in DEGREE mode.
- Diagrams have not necessarily been drawn to scale.
- **Give reasons for all statements used in geometry.**

Questions	**1**	**2**	**3**	**4**	**5**	**6**
Out of	9	11	12	17	6	9
Mark						
Question	**7**	**8**	**9**	**10**	**11**	**TOTAL**
Out of	6	7	9	9	5	100
Mark						

SECTION A
QUESTION 1 [9]

The equations of the following lines are given:

AB	$y = \frac{1}{2}x$
CD	$y = 2$
EF	$3y - 2x - 3 = 0$
GH	$3y + 2x - 6 = 0$
JK	$y = -2x + 4$
LM	$x = \pm 2$

Choose from the above list a line which will satisfy the conditions in each of the following cases.

Each line may only be used once.

Show all calculations used to arrive at your answer.

1.1 The line cuts the x-axis at (3; 0). (2)

1.2 The line is parallel to the line $y = \frac{2}{3}x + 3$ (2)

1.3 The line has a gradient of zero. (1)

1.4 The line represents all points 2 units from the y-axis. (1)

1.5 The line has an angle of inclination of 116,6° (2)

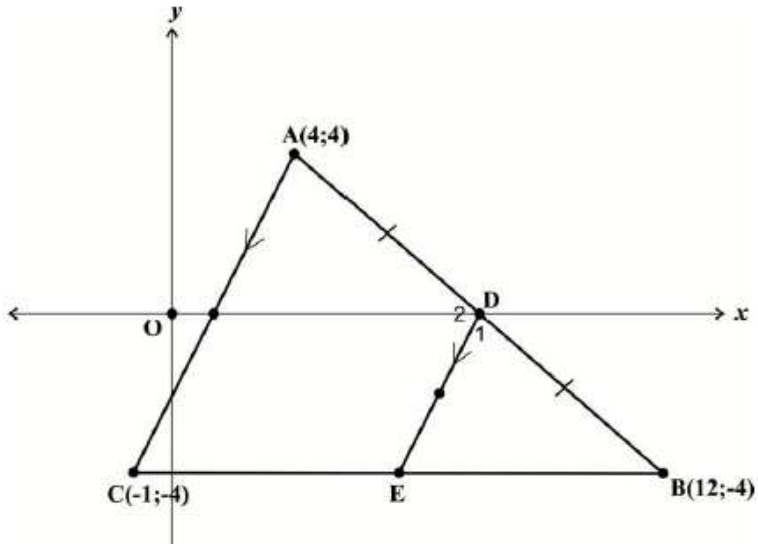
1.6 The line is perpendicular to line JK. (1)

QUESTION 2 [11]

In the diagram below, the coordinates of A(4; 4), B(12; -4) and C(-1; -4) are given.

AC // DE and CEB is a straight line.

D is the midpoint of AB.



Determine:

2.1 the length of AB. Give answer correct to one decimal digit. (2)

2.2 the coordinates of D, the midpoint of AB. (2)

2.3 the equation of the line DE. (4)

2.4 the coordinates of E. (3)

QUESTION 3 [12]

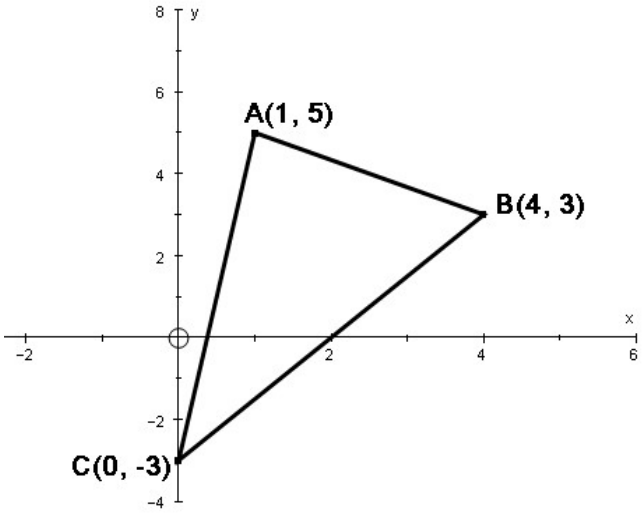
3.1 $M(3;2)$ is the midpoint of $A(-2;5)$ *and* $B(a;-1)$. Find the value of *a*. (3)

3.2 Given the points $P(1;3)$, $Q(3;2)$ *and* $R(-1;-1)$:
Determine the equation of the straight line through *R* perpendicular to *PQ*. (4)

3.3 Consider the points: $D(-1;1)$, $E(t;t^2)$ *and* $F(1;2t-1)$:
Show that these 3 points are collinear. (5)

QUESTION 4 [17]

A(1;5), B(4.3) and C(0;-3) are the vertices of the triangle.



4.1 Determine, using analytical methods, the coordinates of D if ABCD is a parallelogram. (5)

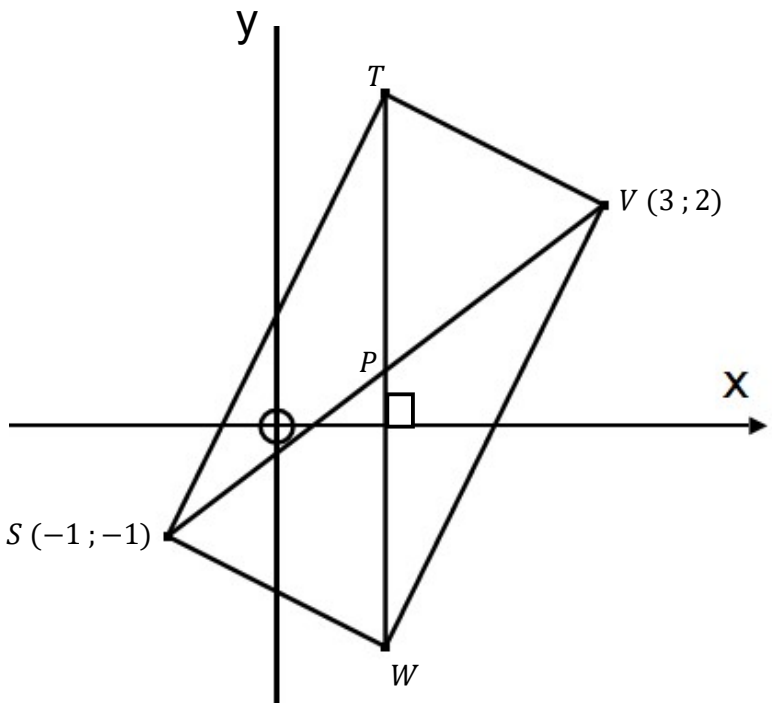
4.2 If the distance between C and F(8;p) is 12 units, find the value(s) of p (to the nearest integer). (5)

4.3 Find the size of $A\hat{C}B$ in Δ ABC (7)

QUESTION 5 [6]

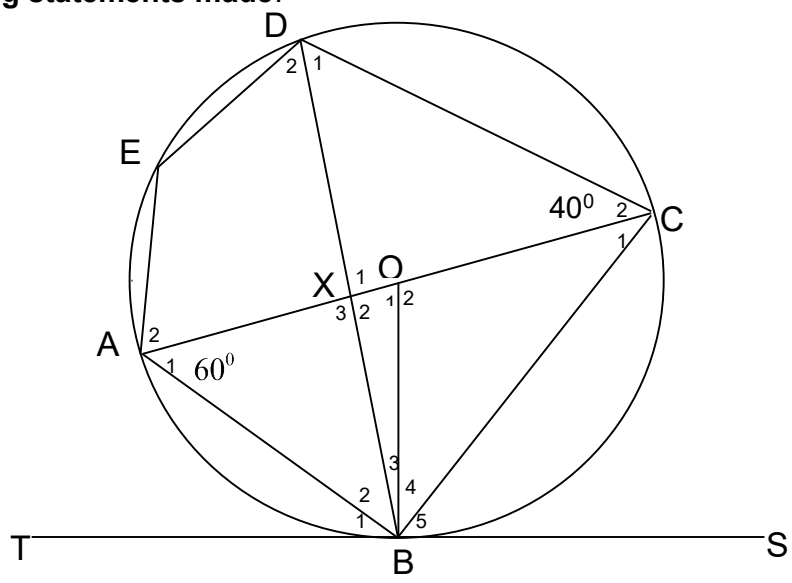
The diagonals of rectangle $STVW$ are equal in length and bisect each other at P.

Calculate the co-ordinates of T and W.



QUESTION 6 [9]

A, B, C, D, and E, are points on the circumference of a circle with centre O.
TBS is a tangent to the circle at B. DB and AC intersect at X.
$\hat{A}_1 = 60^0$ *and* $\hat{C}_2 = 40^0$
Give the reasons to the following statements made.



6.1 $\hat{D}_1 = 60^0$

_____ (1)

6.2 $\hat{O}_2 = 120^0$

_____ (1)

6.3 $\hat{B}_2 + \hat{B}_3 + \hat{B}_4 = 90^0$

_____ (1)

6.4 $\hat{C}_1 = 30^0$

_____ (1)

6.5 $\hat{B}_1 = 30^0$

_____ (1)

6.6 $\hat{B}_4 = 30^0$

_____ (1)

6.7 $\hat{E} = 140^0$

_____ (1)

6.8 $\hat{B}_2 = 40^0$

_____ (1)

6.9 $X_3 = 80^0$

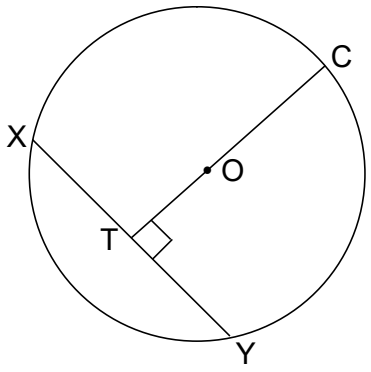
_____ (1)

QUESTION 7 [6]

O is the centre of the circle, and COT $\perp$ XY.

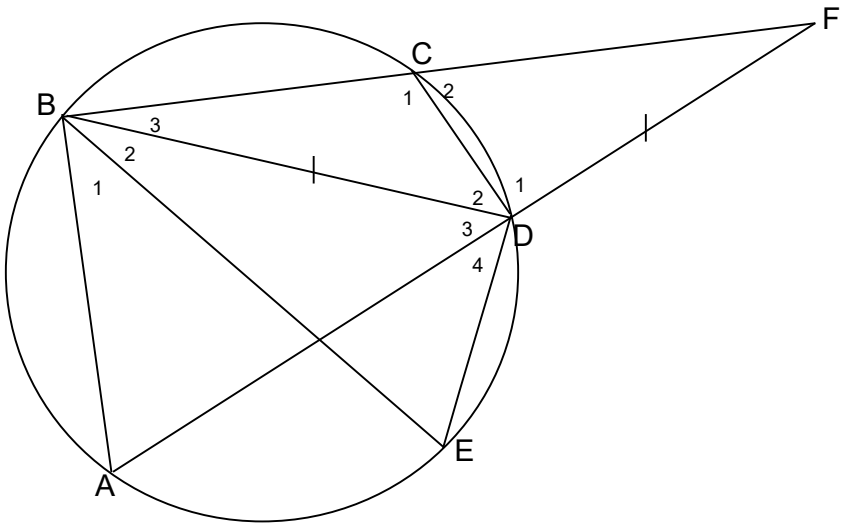
If OC = 10 and XY = 12,

Find the length of CT.



(6)

QUESTION 8 [7]



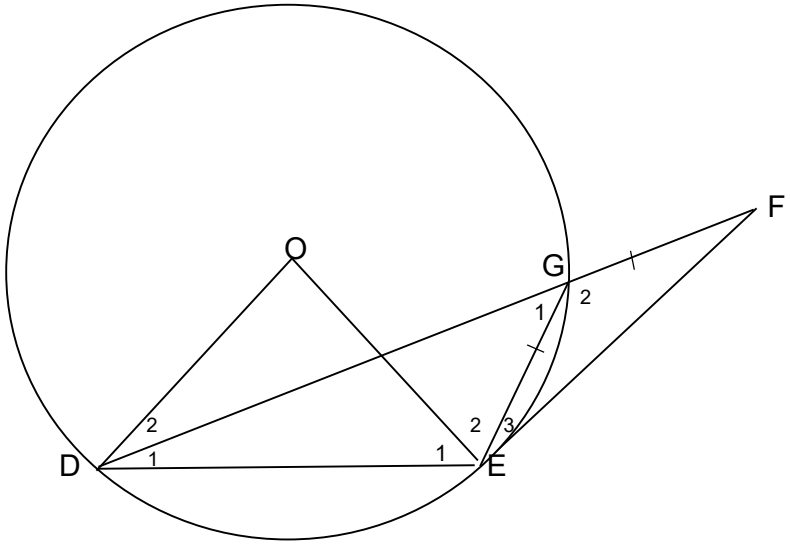
BE is the diameter. BD = DF. BCF and ADF are straight lines. $\hat{B}_2 = 15°$ and $\hat{F} = 10°$.
Calculate:

8.1 $\hat{A}$ (3)

8.2 $\hat{C}_1$ (1)

8.3 $\hat{D}_4$ (3)

QUESTION 9 [9]



FE is a tangent to the circle with centre O. D and F are joined so that EG = GF.

9.1 If $\hat{E}_3$ = p, name, with reasons, two other angles which are equal to p. (2)

_____

_____

_____

_____

9.2 Express $D\hat{O}E$ in terms of p. (3)

_____

_____

_____

_____

9.3 Express $O\hat{E}D$ in terms of p. (4)

_____

_____

_____

_____

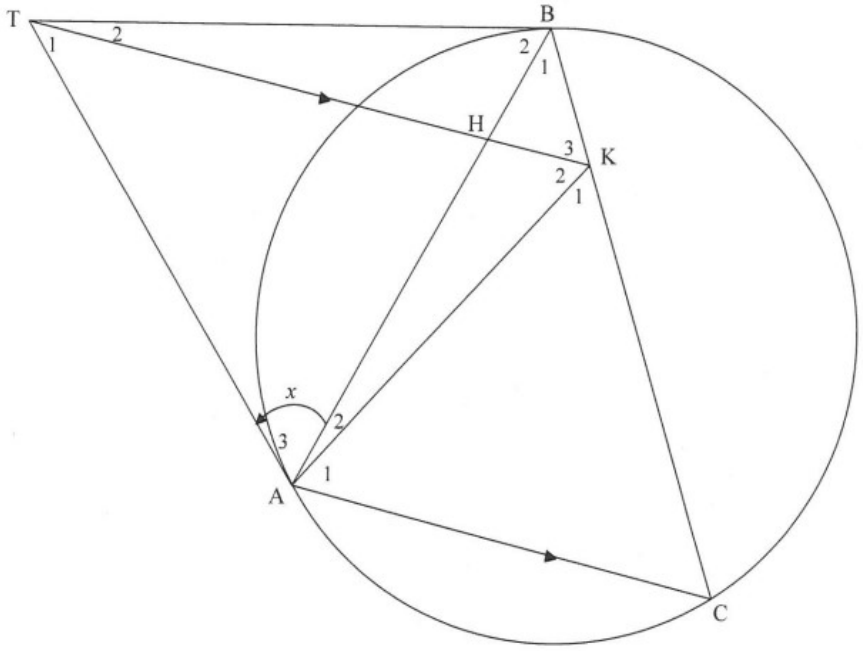
_____

QUESTION 10 [9]

In the diagram alongside, ΔABC is drawn in the circle.

TA and TB are tangents to the circle.

The straight line THK is parallel to AC with H on BA and K on BC.
AK is drawn.



Let $\hat{A}_3 = x$

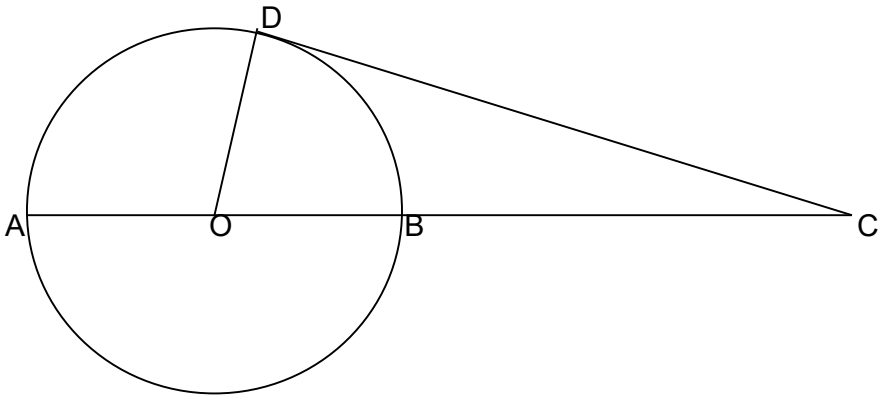
10.1 Prove that $\widehat{K}_3 = x$. (2)

10.2 Prove that AKBT is a cylic quadrilateral. (2)

10.3 Prove that TK bisects $A\widehat{K}B$. (3)

10.4 Prove that TA is a tangent to the circle passing through the points A, K and H. (2)

QUESTION 11 [5]



CD is a tangent at D to the circle with centre O. CD = 10 units. AC = 25 units.
If r is the radius, show that r = 10,5 units. (5)

FORMULAE:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan\theta$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

More space for working if needed: