HILLCREST HIGH SCHOOL

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INTERNAL ASSESSMENT

GRADE 11

MATHEMATICS
Paper 2
June 2022

MARKS: 100 **TIME:** 2 hours

NAME : _____

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EXAMINER	MODERATOR				

This question paper consists of 12 pages.

QUESTION	1	2	3	4	5	6	7	8	9	10	11	TOTAL
MARK	18	6	6	4	12	9	13	8	10	7	7	100
MARKS												

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of **11** questions.
2. Answer ALL the questions.
3. Answer the questions correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Formulae is included at the beginning of the question paper.
10. Write neatly and legibly.

INFORMATION SHEET: MATHEMATICS

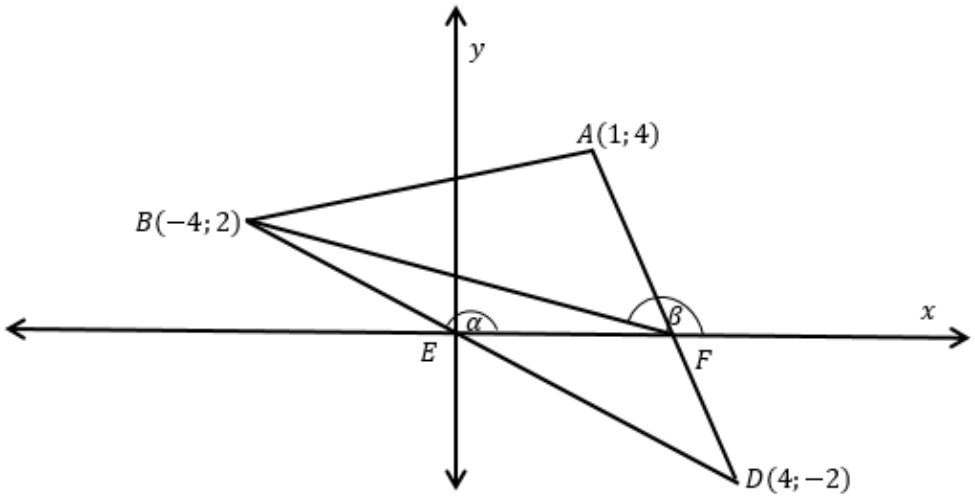
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

QUESTION 1

$A(1;4)$, $B(-4;2)$ and $D(4;-2)$, are the coordinates of the vertices of ΔABD . Line $BF$is drawn.



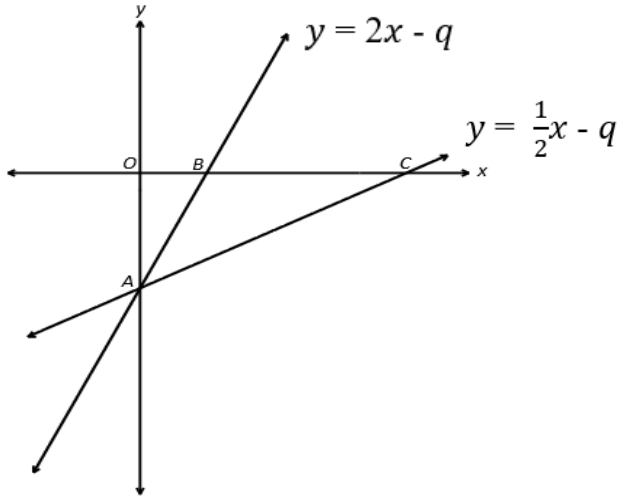
1.1	Calculate the length of AB, giving your answer in simplified surd form.	(2)
1.2	Show that the coordinates of point F is $(3;0)$, if the equation of AD is $y = -2x + 6$.	(3)
1.3	Determine the gradient of BF.	(2)
1.4	Calculate the size of β, the angle BF makes with the positive x −axis.	(3)

1.5	AB is produced to G, so that B will then be the midpoint of GA. Determine the coordinates of G.	(4)
1.6	Write down the coordinates of P, if $BADP$ is a parallelogram.	(2)
1.7	Calculate the area of ΔBEF.	(2)
		[18]

QUESTION 2

$y = 2x - q$ and $y = \frac{1}{2}x - q$

are sketched.



2.1	State the coordinates of A in terms of q.	(2)
2.2	Determine, in terms of q, the coordinates of B and C.	(4)
		[6]

QUESTION 3

Each question has only **ONE** correct answer. Calculate each and then **circle the correct letter.**									
3.1	Find the midpoint of the line segment connecting the points $(a;b)$ and $(5a;-7b)$.								
	A.	$(3a;-3b)$	B.	$(2a;-3b)$	C.	$(3a;-4b)$	D.	$(-2a;4b)$	(2)
3.2	The equations $2kx-y-5=0$ and $6x-y-7=0$ represent parallel lines. Determine the value of k.								
	A.	-6	B.	-3	C.	3	D.	6	(2)
3.3	If A$(4;1)$ and $B(x;5)$ has a distance of $\sqrt{20}$ between them. A possible value of x is								
	A.	4	B.	3	C.	2	D.	1	(2)
									[6]

QUESTION 4 PLEASE ENSURE THAT YOUR CALCULATOR IS IN DEGREE MODE.

4.1	If $x=134{,}3°$ and $y=68{,}5°$, calculate the value of each of the following: (2 dec)		
	4.1.1	$\frac{\sin x}{2}$	(1)
	4.1.2	$\cos\frac{y}{2}$	(1)
4.2	If $2\cos\theta=1$ **,** calculate the values of θ, where $\theta \in [0°;180°]$.		(2)
			[4]

QUESTION 5

5.1 If $\sin 40° = m$, without a calculator, and with the aid of a diagram, express each of the following in terms of m.

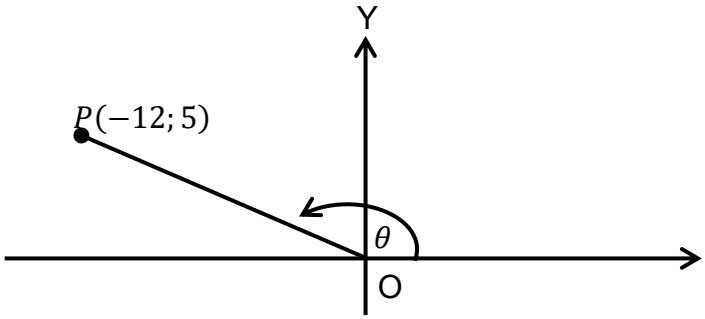
5.1.1 $cosec\ 40°$ (3)

5.1.2 $\tan 40°$ (2)

5.1.3 $\sin 320°$ (2)

5.2 Refer to the diagram below:

$P(-12;5)$ lies in the second quadrant and $P\hat{O}X = \theta$.



Determine, without a calculator:

5.2.1 $sin\,\theta$ (3)

5.2.2 $tan(360° - \theta)$ (2)

[12]

QUESTION 6

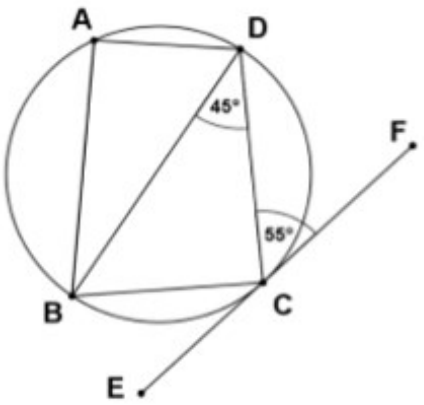
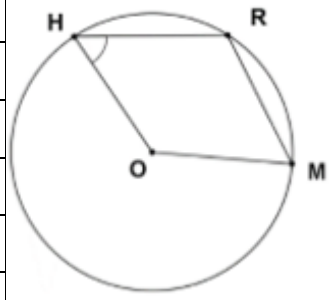
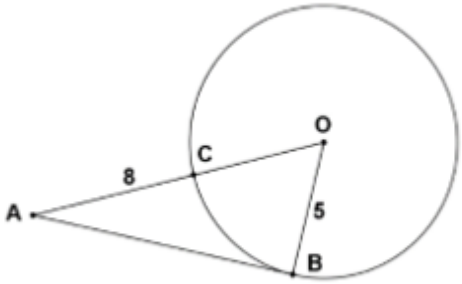
6.1	Prove that $4\,sin\,150° \cdot cos\,210° \cdot tan(-60°) = 3$, **without the use of a calculator**.	(4)
6.2	Simplify as far as possible, without a calculator:	(5)
	$\frac{cos(180° - \theta) \cdot sin\,50° \cdot cos(90° - \theta)}{cos(-\theta) \cdot cos\,140°}$	
		[9]

QUESTION 7

7.1	Complete each of the following basic identities:		
	7.1.1	$tan\,\theta = \frac{\theta}{\theta}$	(1)
	7.1.2	$sin^2\,\theta + \ldots\ldots\ldots\ldots = 1$	(1)
	7.1.3	$cos^2\,\theta = 1 - \ldots\ldots\ldots$	(1)
7.2	Use the basic identities to prove that $\frac{1}{(cos\,x+1)(cos\,x-1)} = \frac{-1}{tan^2\,\theta.cos\,x}$		(4)
7.3	Find the general solution if $2\,sin^2\,\theta - 3\,sin\,\theta - 2 = 0$.		(6)
			[13]

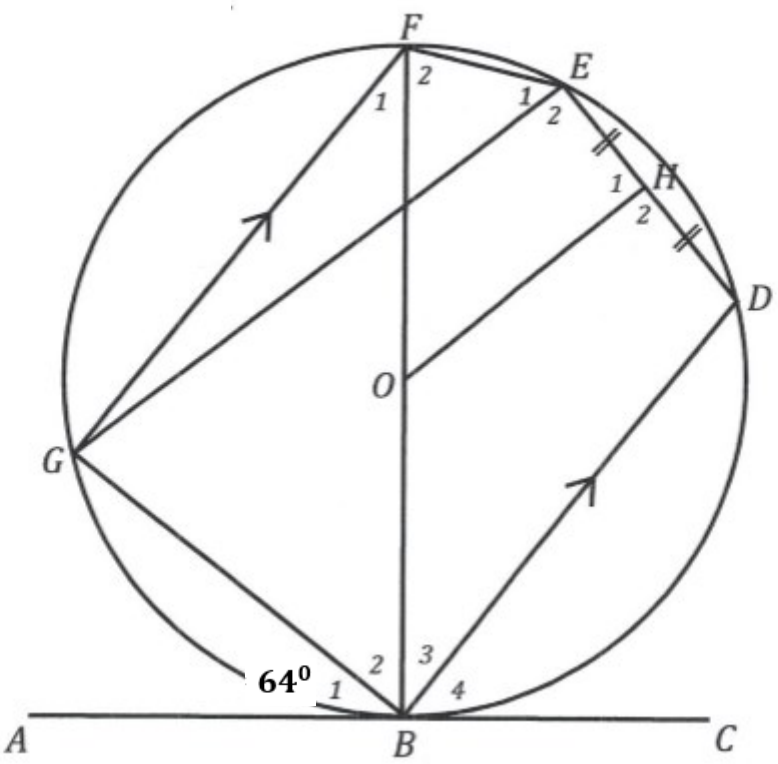
QUESTION 8

Circle the correct solution only.

8.1	Which of the following is NOT a valid reason for proving that a quadrilateral **is cyclic**?		(2)
	A.	Opposite angles are supplementary	
	B.	Angles at the circumference subtended by the same arc/chord are equal.	
	C.	Sum of interior angles = $180°$	
	D.	Exterior angle equals interior opposite angle	
8.2	Points A, B, C and D lie on the circle. EF is a tangent to the circle at C. $B\hat{D}C = 45^0$ and $D\hat{C}F = 55^0$. The value of $B\hat{A}D$ is:		(2)
	A.	$80°$	
	B.	$90°$	
	C.	$100°$	
	D.	$110°$	
8.3	$RHOM$ is rhombus with points R, H and M on the circle with centre O. (Hint : Let $\hat{R} = x$) (The diagram is not drawn to scale) $R\hat{H}O =$		(2)
	A.	$30°$	
	B.	$45°$	
	C.	$60°$	
	D.	Impossible to determine	
8.4	AB is a tangent to a circle with centre O. OA is a straight line passing through the circumference of the circle at C. AC = 8cm and radius OB = 5cm. AB is equal to:		(2)
	A.	5cm	
	B.	12cm	
	C.	13cm	
	D.	8cm	
			[8]

QUESTION 9

In the diagram below, ABC is a tangent to the circle with centre O. FOB is a diameter.
$GF \,//\, BD$, $EH = HD$ and $\hat{B}_1 = 64^0$.

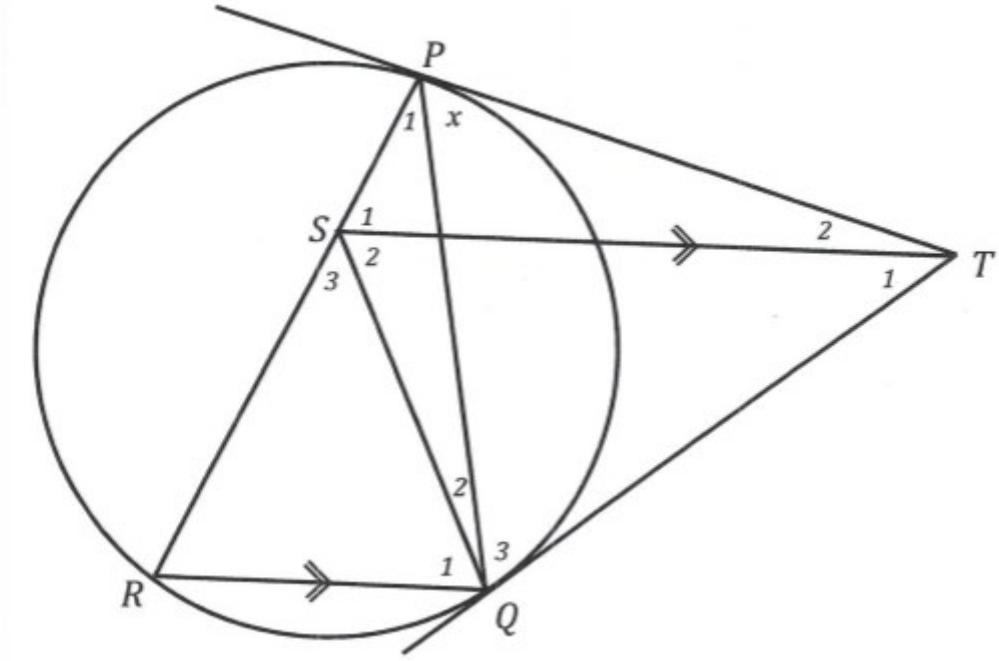


Calculate, **with reasons**, the sizes of the following angles:

9.1	$\hat{B}_2$	(2)
9.2	$F\hat{G}B$	(2)
9.3	$\hat{F}_1$	(2)
9.4	$\hat{B}_3$	(2)
9.5	$\hat{H}_1$	(2)
		[10]

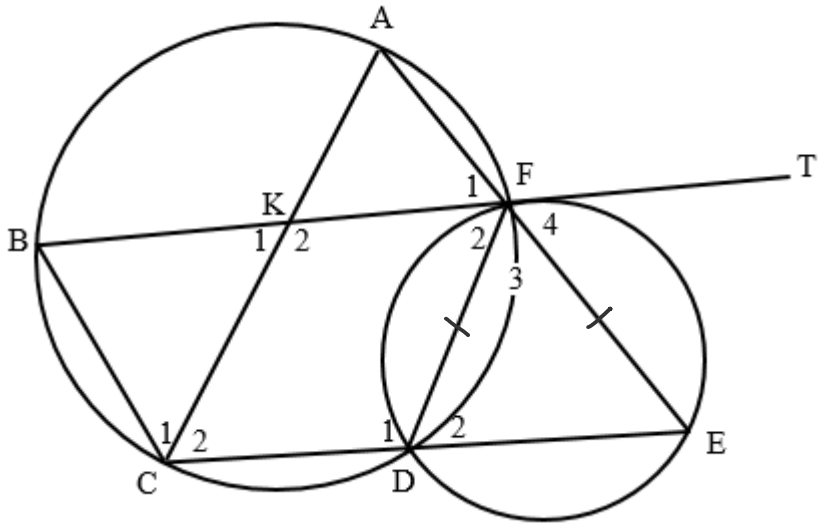
QUESTION 10

In the figure TP and TQ are tangents to the circle PQR.
$T\hat{P}Q = x$ and $RQ // ST$.



10.1	Name, **with reasons**, 3 other angles equal to x.	(3)
10.2	Prove that $TPSQ$ is a cyclic quadrilateral.	(2)
10.3	Hence, or otherwise, prove $P\hat{S}Q$ is bisected by TS.	(2)
		[7]

QUESTION 11



Two circles intersect at F and D. BFT is a tangent to the small circle at F.
AFE and CDE are straight lines. **FD = FE**. AC and BF cut at K.
Prove the following, **with reasons**:

11.1	$BT \parallel CE \qquad (Hint: Let\ \hat{F}_4 = x)$	(4)
11.2	BCEF is a parallelogram	(3)
		[7]
	TOTAL = 100	