MEMO: GRADE 11 NOVEMBER PAPER 2

QUESTION 1

1.1.1 $\bar{x} = \frac{246}{6}$ ✓ $= 41$ ✓ (2)R

1.1.2 SD = 21,50 ✓ (1)R

1.1.3 Numbers between 19,5 ✓ and 62,5✓: 4 ✓numbers (3)R

1.2 $T_1 = 1$ $T_4 = 3$

$T_2 = 5$ $T_5 = 3$

$T_3 = 3$ $T_{25} = 3$✓✓ (2)PS

[8]

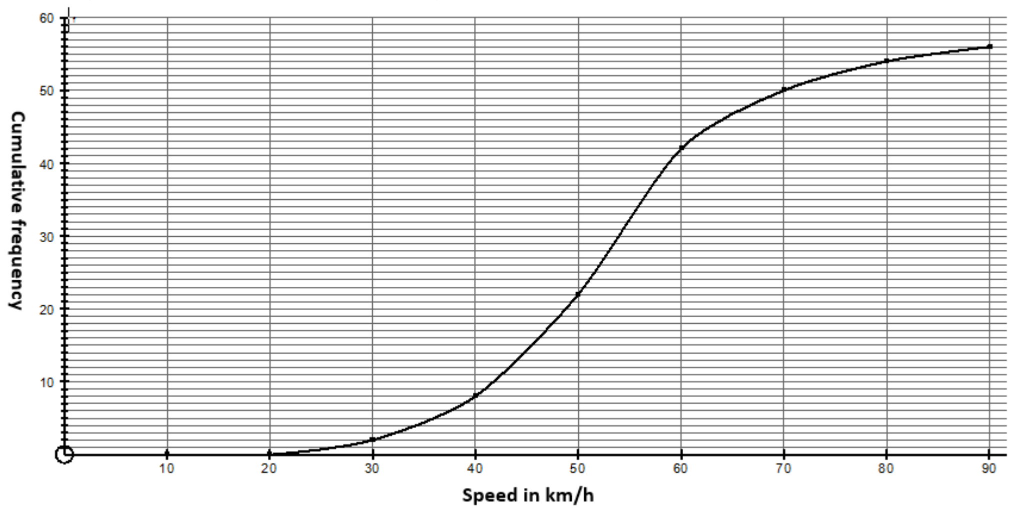
QUESTION 2

2.1

Interval	Frequency	Cumulative Frequency
$20 < x \leq 30$	2	2
$30 < x \leq 40$	6	8
$40 < x \leq 50$	14	22
$50 < x \leq 60$	20	42
$60 < x \leq 70$	8	50
$70 < x \leq 80$	4	54
$80 < x \leq 90$	2	56

✓ (1)R

2.2 grounded at 20✓mark at higher limit of interval✓smooth curve✓ (3)R



2.3 56-52✓ = 4✓ will get fines (2)C

[6]

QUESTION 3

3.1 y = A+Bx

= 9,68 ✓+ 7,81x✓✓ (3)R

3.2 r = 0,94. ✓ That points to a very strong positive correlation between money spent on advertising and profit made by the company. This correlation coefficient is supported by the quote which says that you can't make money without advertising. ✓ (2)C

[5]

QUESTION 4

4.1 $m_{\text{AB}} = \frac{-2-4}{7}$ ✓

$= \frac{-6}{7}$ ✓ (2)R

4.2 $M = (\frac{-2+5}{2}; \frac{4-2}{2})$ ✓

$= (\frac{3}{2}; 1)$ ✓ (2)R

4.3 $\sqrt{21,25} = \sqrt{(a-\frac{3}{2})^2 + (0-1)^2}$ ✓

$\frac{85}{4} = a^2 - 3a + \frac{9}{4} + 1$

$a^2 - 3a - 18 = 0$✓

$(a-6)(a+3) = 0$

$a = 6 \text{ or } a = -3$✓

$\text{D}(-3; 0)$ ✓ (4)C

4.4 C(−6,5; 3) ✓✓ (2)R

[10]

QUESTION 5

5.1 QP: $y = mx + c$

$= 6✓x + c$ (QP ∥ OS)

At P(-3; 17): $17 = 6(-3) + c$✓

$c = 35$

$y = 6x + 35$✓ (3)R

5.2 $-x = 6x + 35$✓ [CA from 5.1]

$7x = -35$✓

$x = -5$✓

$y = 5$✓ Q(−5; 5)

(4)R

5.3 $m_{OQ} = -1$

$Q\hat{O}X = 135°$✓

$\tan S\hat{O}X = 6$

$S\hat{O}X = 80{,}54°$✓

$\alpha = 135° - 80{,}54°$

$= 54{,}46°$✓ (3)C

5.4 QP = $\sqrt{(-3+5)^2 + (17-5)^2}$ ✓ [CA from 5.2]

$= 2\sqrt{37}$✓

∴ OS = $2\sqrt{37}$✓ (opp. sides of a parm) ✓ (4)C

5.5 In ΔQOS:

$QS^2 = OQ^2 + OS^2 - 2.OQ.OS.\cos\alpha$ ✓

$= 50 + 148 - 2.\sqrt{50}.\sqrt{148}.\cos 54{,}46°$ ✓

$= 97{,}994\ldots$

QS = 9,90 units✓

OR

Find S through inspection

S(2; 12) ✓

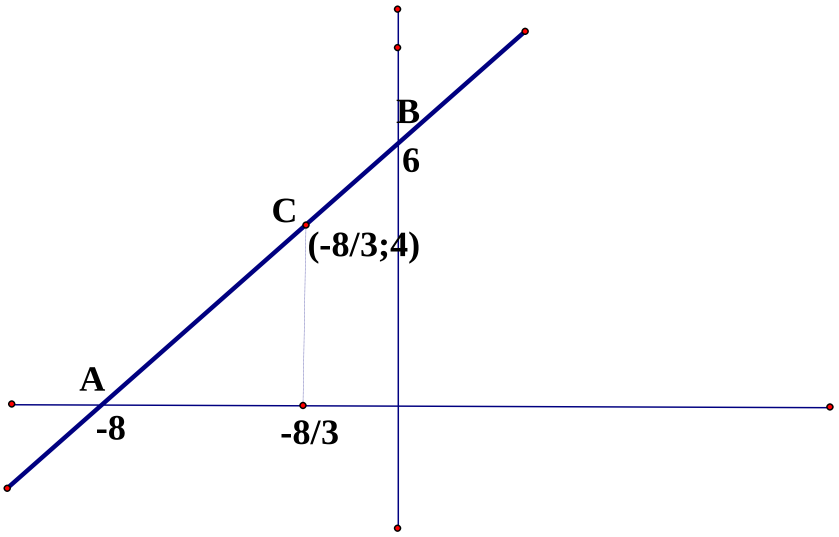
QS = $\sqrt{(-5-2)^2 + (5-12)^2}$✓

QS = 9.90 units✓

(3)C

[17]

QUESTION 6



$y = \frac{3}{4}x + 6$
B(0;6)
A: $-6 = \frac{3}{4}x$
$x = -8$
3AC= 2AB
$\frac{AC}{AB} = \frac{2}{3}$.
$\frac{1}{3} \times -8 = \frac{-8}{3}$

$x - \text{coordinate at C} = \frac{-8}{3}$

$y - \text{coordinate at C} = \frac{3}{4}\left(\frac{-8}{3}\right) + 6$
$= 4$

A$(-8; 0)$✓
B$(0; 6)$✓
C$(\frac{-8}{3}$✓$; 4$✓$)$

OR

$AB = 10$ (Pythagoras)

$3AC = 2(10)$

$AC = \frac{20}{3}$

$$\frac{20}{3} = \sqrt{(x+8)^2 + (\frac{3}{4}x + 6)^2}$$

$$\frac{20}{3} = \sqrt{(x+8)^2 + (\frac{3}{4}x + 6)^2}$$

$0 = 225x^2 + 3600x + 8000$

$0 = 9x^2 + 144x + 320$

$x = -\frac{8}{3}$ or $x = -\frac{40}{3}$

C$(-\frac{8}{3}; 4)$ [4]PS

QUESTION 7

7.1 $\dfrac{\cos(90°+\theta).\sin(180°-\theta)}{(\cos 90°+cos\theta)(\cos 90°-cos\theta)}$

$= \dfrac{(-sin\theta ✓)(\sin\theta) ✓}{(cos^2 90°-cos^2\theta) ✓}$

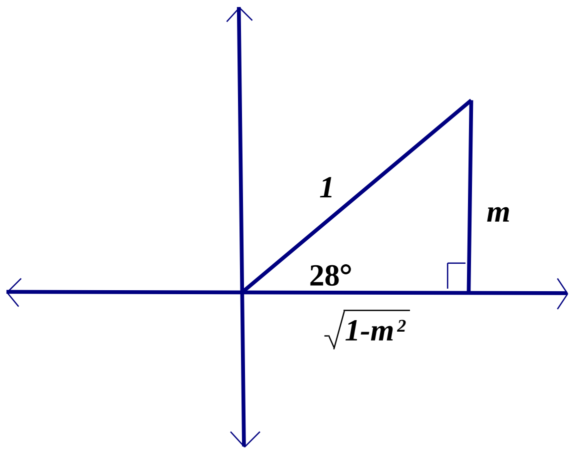
$= \dfrac{-sin^2\theta}{-cos^2\theta ✓}$

$= tan^2\theta ✓$ (5)R

7.2 7.2.1 $\sin(-28°)$

$= -\sin 28° ✓$

$= -\text{m} ✓$ (2)R



7.2.2 $\cos 478°$

$= \cos(360° + 118°)$

$= -\cos 62°$

$= -\cos(90° - 28°)$

$= -\sin 28°$ ✓

$= -\text{m}$ ✓ (2)R

7.2.3 $\tan 152°$

$= \tan(180° - 28°)$

$= -\tan 28° ✓$

$= -\dfrac{\text{m} ✓}{\sqrt{1-\text{m}^2} ✓}$ (3)R

7.3 LHS: $\tan\beta + \dfrac{\cos\beta}{1+sin\beta}$ RHS: $\dfrac{cos\beta}{1-sin^2\beta}$

$= \dfrac{\sin\beta}{\cos\beta} ✓ + \dfrac{\cos\beta}{1+sin\beta}$ $= \dfrac{cos\beta}{cos^2\beta ✓}$

$= \dfrac{\sin\beta(1+\sin\beta)+cos^2\beta}{\cos\beta(1+sin\beta)} ✓$ $= \dfrac{1}{\cos\beta}$

$= \dfrac{\sin\beta+sin^2\beta+cos^2\beta}{\cos\beta(1+sin\beta)} ✓$ LHS=RHS

$= \dfrac{(\sin\beta+1) ✓}{\cos\beta(1+sin\beta)}$

$= \dfrac{1}{\cos\beta}$ (5)R

7.4 $\dfrac{\sin\frac{1}{2}x}{\cos\frac{1}{2}x} = \tan\frac{1}{2}x$ for all $x \in (-180° ✓; 360°] ✓, x \neq 180° ✓$ (3)C

[20]

QUESTION 8

8.1.1 $\frac{\sin \hat{Q}}{17,4} = \frac{\sin \hat{P}}{10,7}$✓

$\text{Sin}\,\hat{Q} = 0,60127 ...$

$\hat{Q} = 180° - 36,96°$✓ $(\hat{Q} > 90°)$

$\hat{Q} = 143,04°$✓ (3)R

8.1.2 $\hat{S} = 180° - 143,04°$ (opp. ∠ of a cyclic quad) ✓

= 36,96°✓ (2)R

8.1.3 $\hat{R}_1 = 90°$✓ (∠ in a semi − circle) ✓S/R

$\sin 36,96° = \frac{17,4}{PS}$ ✓

PS = 28,94✓

or $\hat{P} = 180° - (90° + 36,96°)$ ✓ (Int. ∠s of a Δ)✓S/R

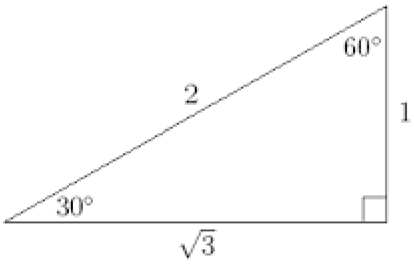
= 53,04°

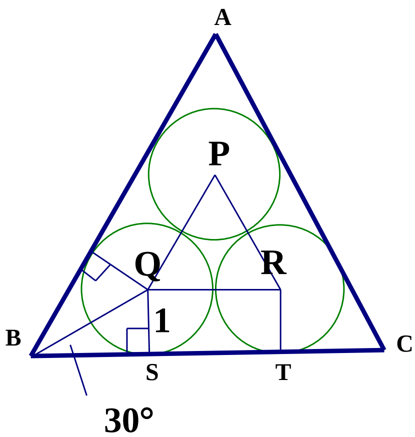
$\text{Cos } 53,04 = \frac{17,4}{PS}$ ✓

PS = 28,94 ✓

(4)C

8.2.1 (1)R

✓ 



8.2.2 $A = \frac{1}{2}(2 + 2\sqrt{3})$✓$(3 + \sqrt{3})$ ✓

$= 6$ ✓$+ 4\sqrt{3}$✓✓

Name centres P, Q and R respectively and draw triangle PQR. QS⊥BC and RT⊥BC.

In triangle BQS, $Q\hat{B}S = 30°$ hence BS = $\sqrt{3} = TC$.

So, BC = 2 + 2$\sqrt{3}$.

Area of an equilateral triangle with side a = $\frac{1}{2}a^2 \sin 60° = \frac{\sqrt{3}}{4}a^2$

So area of triangle ABC = $\frac{\sqrt{3}}{4}(2 + 2\sqrt{3})^2 = \sqrt{3}(1 + \sqrt{3})^2$

$= \sqrt{3}(4 + 2\sqrt{3}) = 4\sqrt{3} + 6$ (5)PS

[15]

QUESTION 9

9.1.1 a) $\sin 2x = \cos(x + 60°)$

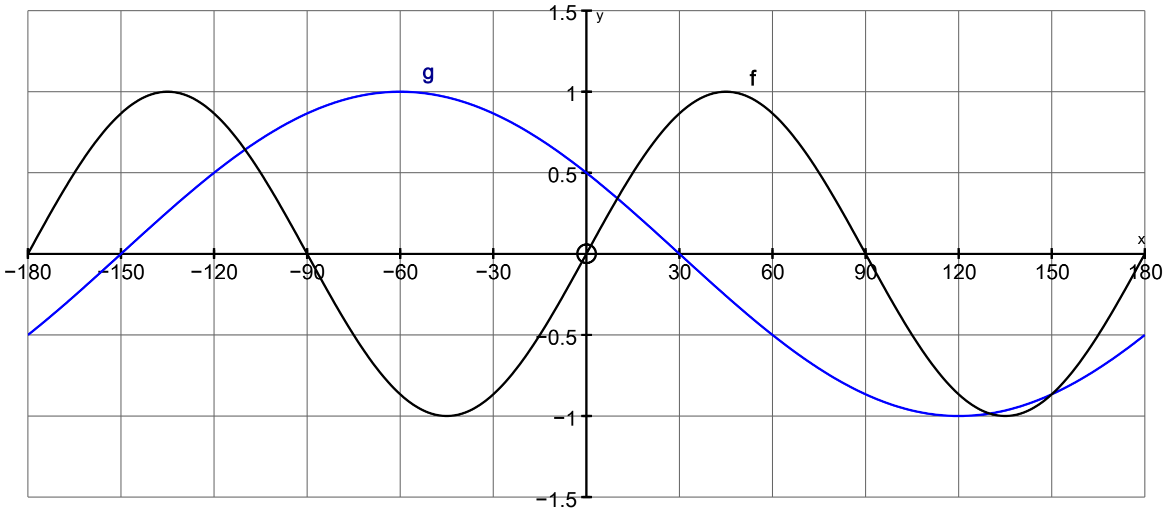
$= \sin(90° - (x + 60°))$✓

$2x = 30° - x + n.360°$ ✓ or $2x = 180° - (30° - x) + n.360°$✓

$3x = 30° + n.360°$ or $x = 150° + n.360°$✓, $n \in Z$

$x = 10° + n.120°$✓, $n \in Z$ $(-1\ if\ n \in Z\ \ omitted)$ (5)R

9.1.2



✓y-intercept

✓x-intercepts

✓correct amplitude (3)R

9.1.3 $-90°$✓ $\leq x \leq 0°$ ✓, $30° < x \leq 90°$ ✓ (3)C

9.2.1 $12 = a + b \sin 0°$ ✓

$a = 12$✓ (2)PS

9.2.2 $22 = 12 + b \sin 90°$

$b = 10$ ✓ (1)PS

9.2.3 $17 = 12 + 10 \sin(10 \times t)$ ✓

$\sin 10t = \frac{1}{2}$

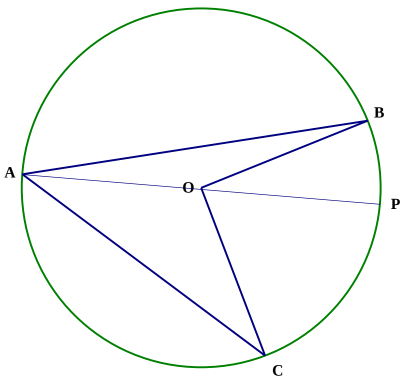
$10t = 30°, 150°, 360°+30°, 360°+150°$

$t = 3, 15, 39, 51$ ✓ (2)PS

[16]

QUESTION 10

10.1 Construct line AOP. ✓



Let $B\hat{A}O = x$

$A\hat{B}O = x$ (∠s opp equal sides) ✓

$B\hat{O}P = 2x$ (ext ∠ of Δ)✓

Let $O\hat{A}C = y$

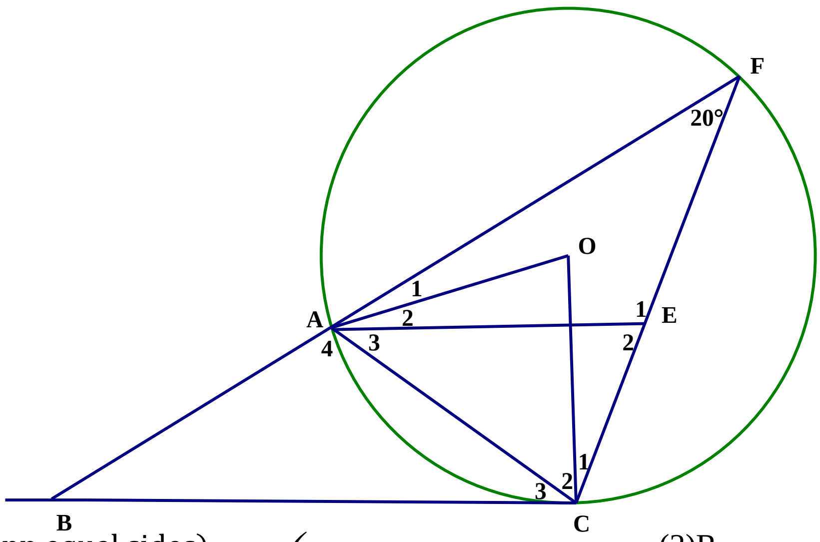
$O\hat{C}A = y$ (∠s opp equal sides)

$C\hat{O}P = 2y$ (ext ∠ of Δ)✓

$\hat{A} = x + y$

$B\hat{O}C = 2x + 2y$✓

$2\hat{A} = B\hat{O}C$ (5)R



10.2 10.2.1 a) $AE = EF$ (given)

$\hat{F} = 20°$ (given)

$F\hat{A}E = 20°$ ✓ (∠s opp equal sides) ✓ (2)R

b) $\widehat{C_3} = 20°$ ✓ (tanchord theorem) ✓ (2)R

c) $A\hat{O}C = 40°$ ✓ (∠ at centre = 2× ∠ on circumference)✓ (2)R

d) $\widehat{E_2} = 40°$ ✓ (ext. ∠ of Δ)✓ (2)R

10.2.2 Yes, it can. $\hat{O} = A\hat{E}C$✓

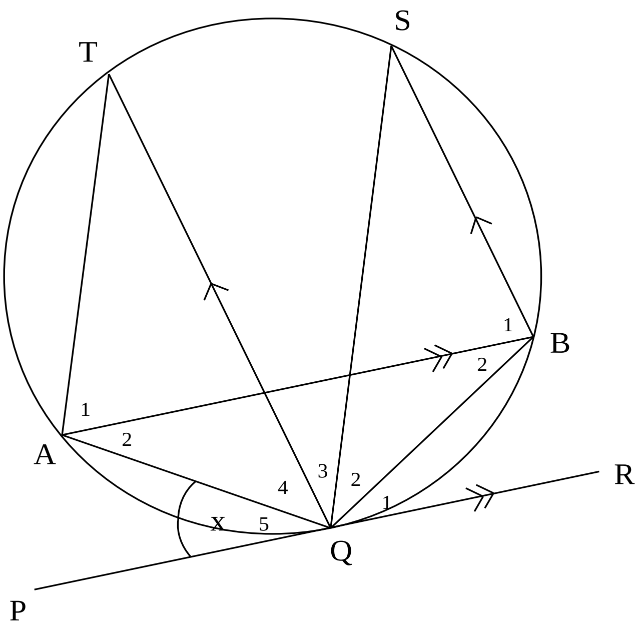
AOEC is concyclic/lies on the perimeter of a circle (converse ∠s in same segment) ✓

(2)R

[15]

QUESTION 11

11.1



Statement	Reason
$\hat{A}_2 = x$	alt ∠s; PR ∥ AB ✓ (1)R
$A\hat{T}Q = x$	tanchord theorem ✓ (1)R
$\hat{B}_2 = x$	tanchord theorem OR ∠s in same segment ✓ (1)R
$\hat{Q}_1 = x$	tanchord theorem OR alt ∠s; PR ∥ AB ✓ (1)R

11.2 $\hat{A}_2 = \hat{B}_2 = x$ ✓ (proved)

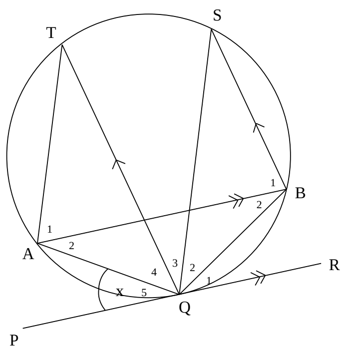
AQ = BQ (sides opp equal ∠s) ✓ (2)C

11.3 $\hat{S} = x$ (tanchord theorem) ✓/ (equal chords, equal angles)

$\hat{Q}_3 = x$ (alt ∠s; SB ∥ TQ) ✓

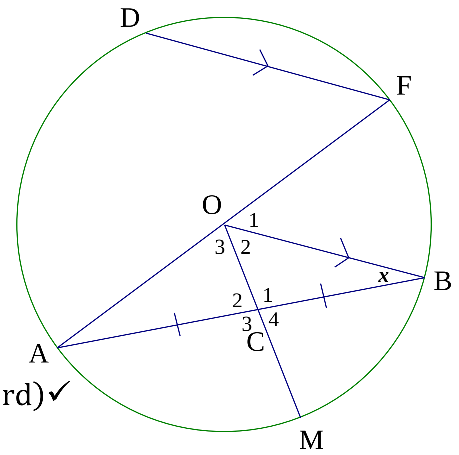
$\hat{T} = S\hat{Q}T = x$ ✓

AT ∥ QS (alt ∠s equal)✓ (4)C



[10]

QUESTION 12



12.1 $\hat{F} = \widehat{O_1}$ (alt ∠s; DF ∥ OB)✓
OA = OB (radii) ✓
$O\hat{B}A = x = O\hat{A}B$ (∠s opp. equal sides)✓
$F\hat{O}B = 2\hat{B} = 2x$ (ext ∠ of Δ)✓
$D\hat{F}A = 2\hat{B}$ (4)R

12.2 OC⊥ AB (line from centre to midpt of chord)✓
Let OC = x
$x^2 + 12^2 = OA^2$ ✓(Pythagoras)✓
But OM = OA (radii)
$x^2 + 12^2 = (x+8)^2$✓
$x^2 + 12^2 = x^2 + 16x + 64$✓
$x = 5$
OC = 5 mm✓ (6)C

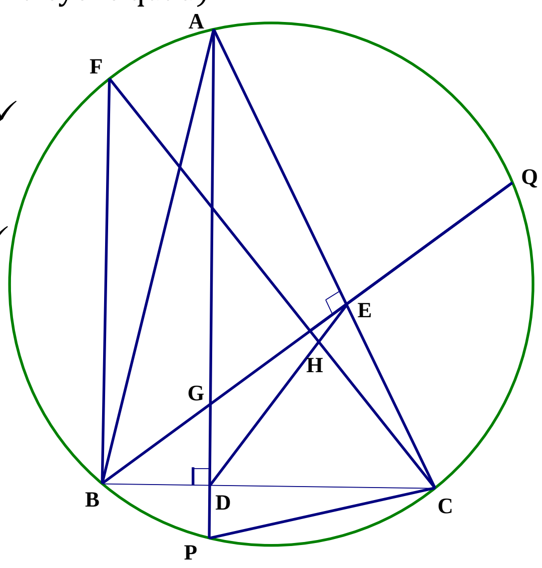
[10]

QUESTION 13

13.1 $B\hat{D}A = B\hat{E}A$ ✓
ABDE is a cyclic quadrilateral (converse ∠s in same segment) ✓ (2)R

13.2 $B\hat{D}A = B\hat{E}A$ ✓
GDCE is a cyclic quadrilateral (converse opp ∠s of cyclic quad) ✓
or $G\hat{E}C = 90°$ (∠s on a str. line) ✓ (2)R
GDCE is a cyclic quadrilateral (ext ∠ of a cyclic quad) ✓

13.3 $F\hat{B}C = 90°$ (∠ in a semi-circle) ✓
$A\hat{D}B = 90°$ (given)
FB ∥ AD (co-int ∠s supplementary) ✓
$F\hat{A}C = 90°$ (∠ in a semi-circle)
$A\hat{E}B = 90°$ (given)
FA ∥ BE (co-int ∠s supplementary)✓
AFBG is a parallelogram
(both prs of opp sides are parallel) ✓ (4)C



13.4 Let $B\hat{E}D = x$
$B\hat{A}D = x$ (∠s in same segment) ✓
$F\hat{B}A = x$ (alt. ∠s; FB ∥ AD) ✓
$A\hat{B}D = 90° - x$✓
$A\hat{F}C = 90° - x$✓ (∠s in same segment) ✓
AFHE is a cyclic quad (converse opp. ∠s of a cyclic quad✓ (6)PS

[14]