BAULKHAM HILLS HIGH SCHOOL

2017
YEAR 11
YEARLY EXAMINATION

Mathematics Extension 1

General Instructions
- Reading time – 5 minutes
- Working time – 2 hours
- Write using black or blue pen
- Black pen is preferred
- Board-approved calculators may be used
- A reference sheet is attached at the back of the paper
- All relevant mathematical reasoning and/or calculations must be shown

Total marks – 70

Section I (Pages 2-5)
10 marks
Attempt Questions 1-10
Allow about 15 minutes for this section

Section II (Pages 6-10)
70 marks
Attempt Questions 11-14
Allow about 1 hour 45 minutes for this section

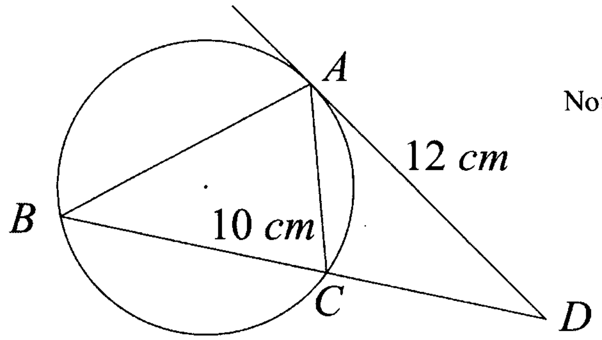
Section I

10 marks
Attempt Questions 1-10
Allow about 15 minutes for this section

Use the multiple-choice answer sheet for Questions 1 to 10

---

1 ABC is a triangle inscribed in a circle. The tangent to the circle at A meets BC produced at D where BC=10 and AD=12.



Not to scale

What is the length of CD?

(A) 6 cm
(B) 7 cm
(C) 8 cm
(D) 9 cm

2 Which expression is the correct expansion of $\sin 4\theta$?

(A) $4\sin\theta\cos^3\theta - 4\sin^3\theta\cos\theta$

(B) $4\sin^3\theta\cos\theta - 4\sin\theta\cos^3\theta$

(C) $4\sin^3\theta\cos^2\theta - 4\sin^2\theta\cos^3\theta$

(D) $4\sin^2\theta\cos^3\theta - 4\sin^3\theta\cos^2\theta$

3 Given that $t = \tan\theta$, which of the following is the equivalent of $\sec 2\theta$?

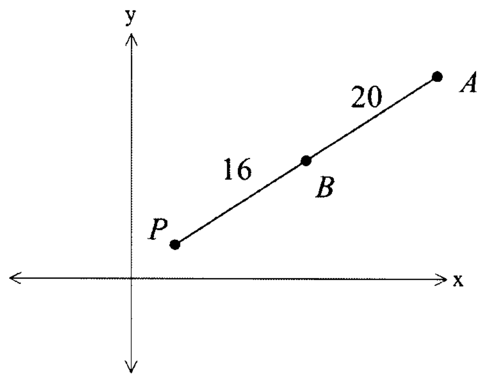
(A) $\dfrac{1+t^2}{1-t^2}$

(B) $\dfrac{1+4t^2}{1-4t^2}$

(C) $\dfrac{2(1+t^2)}{1-t^2}$

(D) $\dfrac{4+t^2}{4-t^2}$

4 In the diagram below $PB = 16$ cm and $BA = 20$ cm.



In what ratio does A divide PB externally?

(A) 5:9

(B) 4:5

(C) 5:4

(D) 9:5

5 From a group of 4 Mathematics teachers and 5 Science teachers a committee of 4 teachers is to be chosen.

How many different possible committees will have a majority of Mathematics teachers?

(A) 10

(B) 21

(C) 36

(D) 121

6 When $-1 \leq x \leq 2$, the expression $|x+1| + 2|x-2|$ is equivalent to

(A) $-3x + 3$

(B) $-x + 5$

(C) $x - 5$

(D) $3x - 4$

7 What is the value of $\tan\frac{\theta}{2}$ if $\cos\theta = -\frac{3}{5}$ and $0° \leq \theta \leq 180°$?

(A) -3 or $-\frac{1}{3}$

(B) -2

(C) $\frac{1}{3}$ or 3

(D) 2

8 What is the Cartesian equation of the tangent, at $t = -3$, to the parabola defined by the parametric equations: $x = t - 3$
$y = t^2 + 2$?

(A) $6x + y + 25 = 0$

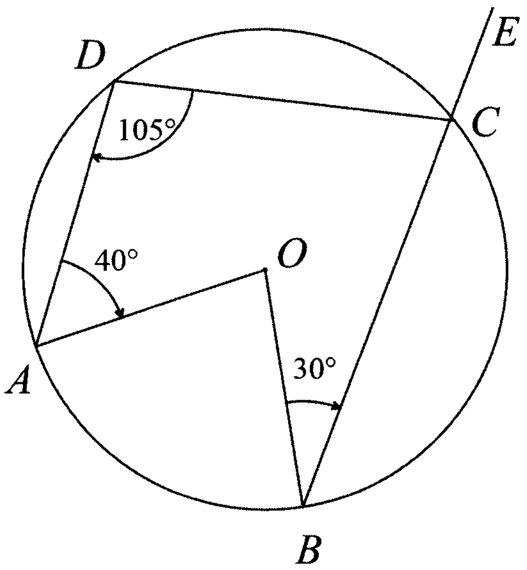
(B) $6x + y + 36 = 0$

(C) $6x - y - 25 = 0$

(D) $6x + 2y - 25 = 0$

9 In the diagram below, O is the centre of the circle $ABCD$. BCE is a straight line.

$\angle ADC = 105°$, $\angle OBC = 30°$ and $\angle OAD = 40°$.



What is the size of $\angle DCE$?

(A) 75°
(B) 80°
(C) 85°
(D) 90°

10 Given that $\tan(x + y) = \dfrac{\tan x + \tan y}{1 - \tan x \tan y}$ and that $\tan p + \tan q + 1 = \cot p + \cot q = 6$

what is the value of $\tan(p + q)$?

(A) $\dfrac{5}{6}$

(B) $\dfrac{6}{5}$

(C) 5

(D) 30

END OF SECTION I

SECTION II

60 marks
Attempt Questions 11 -14
Allow about 1 hour 45 minutes for this section

Answer each question on the appropriate answer sheet. Each answer sheet must show your name. Extra paper is available.

In Questions 11 to 14, your responses should include relevant mathematical reasoning and/or calculations.

Question 11 ***(15 marks)*** Use a separate answer sheet **Marks**

(a) Solve for x: $\dfrac{x+3}{x-2} \geq 2$ **3**

(b) Find the exact value of $\cos 2x$ if $\sin x = \sqrt{3} - 1$. **2**

(c) The graphs of $y = \dfrac{1}{x}$ and $y = x^3$ intersect at $x = 1$. Find the size of the acute angle between these two curves at $x = 1$. Give your answer correct to the nearest degree. **3**

(d) Find the exact value of $\tan 75°$, expressing your answer in the form $a + \sqrt{b}$. **3**

(e) The domain of the function $g(x) = \sqrt{4x^2 + kx + 9}$ is all real x. Find the possible values of k. **2**

(f) Find the number of ways in which 3 boys and 3 girls can be arranged in a line so that the two end positions are occupied by boys and no two boys are next to each other. **2**

End of Question 11

Question 12 *(15 marks)* Use a separate answer sheet **Marks**

(a) Solve the equation $\sin 2x = \tan x$ for $0° \leq x \leq 360°$. **3**

(b) In how many ways can 6 students and 4 teachers be seated around a circular table if all the teachers are separated? **2**

(c) Solve for x: $\sqrt{10 - x} = x + 2$. **3**

(d) (i) Express $8 \cos x - 15 \sin x$ in the form $R \cos(x + \alpha)$ where $0° \leq \alpha \leq 90°$. **2**

(ii) Hence solve $8 \cos x - 15 \sin x = 7$ for $0° \leq x \leq 360°$, giving your answer correct to the nearest degree. **2**

(e) (i) The point P divides the interval joining points $A(1,7)$ and $B(4,2)$ in the ratio $k{:}1$. Write down the coordinates of the P in terms of k. **1**

(ii) Hence, or otherwise, find the ratio in which the line $y = 2x + 3$ divides the interval joining $A(-1,7)$ and $B(4,2)$. **2**

End of Question 12

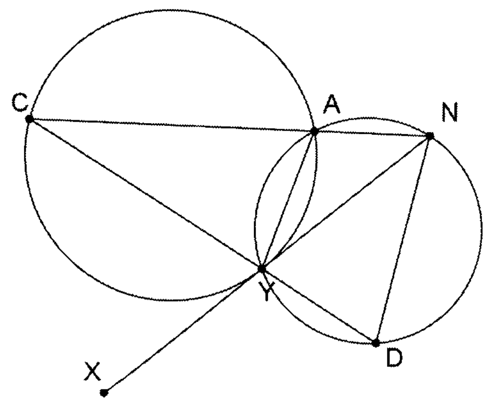
Question 13 ***(15 marks)*** Use a separate answer sheet **Marks**

(a) Rearrange the equation $\cos(x + B) = b \sin x$ to find an expression for $\tan x$. **2**

(b) (i) The line $mx - y + 3 - 2m = 0$ always passes through a fixed point. Find the coordinates of this fixed point. **1**

(ii) This point lies on the parabola $y = x^2 + 4x - 8$. Find the values of m, if $mx - y + 3 - 2m = 0$ is a tangent to the parabola. **2**

(c) NYX is a tangent to circle CAY. The lines CAN and CYD are both secants.



Copy the diagram into your answer booklet.

(i) Prove that ΔCNY is similar to ΔYNA. **3**

(ii) Show that $NY=ND$. **2**

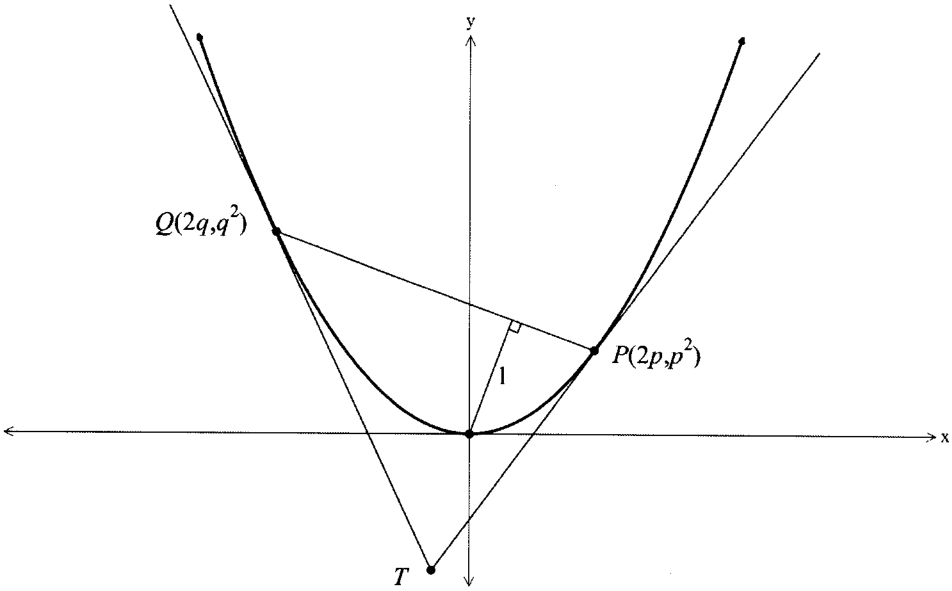
(d) (i) Find the equation of the tangent to the curve $y = \dfrac{x+1}{x^2+3}$ at the point where the curve cuts the x axis. **2**

(ii) Show that the tangent meets the curve again at a point where the function has a stationary point. **3**

End of Question 13

Question 14 *(15 marks)* Use a separate answer sheet **Marks**

(a) The points $P(2t,t^2)$ and $Q(2q,q^2)$ are variable points on the parabola $x^2 = 4y$.



(i) Prove that the equation of the PQ is $(p + q)x - 2y - 2pq = 0$. **2**

(ii) The equation of a tangent to the parabola is

$$y = tx - t^2 \quad \text{(DO NOT PROVE THIS)}$$

Show that the point of intersection, T, of the tangents at P and Q is $(p + q, pq)$ **2**

(iii) The line PQ moves so that it is always 1 unit from the origin. Find the Cartesian equation of the locus of T. **3**

Question 14 continues on the following page

(b) The letters of the word PERSEVERE are arranged in a straight line.

(i) How many different arrangements are possible? **2**

(ii) How many ways are all the E's together in one group and all the R's together in another group? **1**

(iii) How many arrangements will have all the E's appearing to the left of any of the R's? **2**

So P E V E E E **R** S **R** is acceptable but P E V E E **R** E S **R** is not.

(c) A man 1.8 metres tall, standing due east of a street light casts a shadow 6.5 metres long. He walks on a bearing of 150°T from his first position for a distance of 12 metres and now finds his shadow is 9.1 metres long. **3**

Find the height of the street light above ground level (correct to the nearest centimetre).

End of paper

Yr 11 Extension 1 2017 Yearly Exam

1. $AD^2 = BD.CD$

$12^2 = CD(CD+10)$

$144 = CD^2 + 10CD$

$CD^2 + 10CD - 144 = 0$

$(CD+18)(CD-8) = 0$

$\therefore CD = 8 \quad (CD > 0)$

$\therefore$ C

2. $\sin 4\theta = 2\sin 2\theta \cos 2\theta$

$= 4\sin\theta\cos\theta(\cos^2\theta - \sin^2\theta)$

$= 4\sin\theta\cos^3\theta - 4\sin^3\theta\cos\theta$

$\therefore$ A

3. $\sec 2\theta = \frac{1}{\cos 2\theta}$

$= \frac{1+t^2}{1-t^2}$

$\therefore$ A

4. $36 : 20$

$9 : 5$

$\therefore$ D

5. 4M, 0S: ${}^4C_4 = 1$

3M, 1S: ${}^4C_3 \times {}^5C_1 = 20$

$1 + 20 = 21$

$\therefore$ B

6. When $-1 \le x \le 2$,

$|1+x| + 2|x-2| = 1 + x - 2(x-2)$

$= -x + 5$

$\therefore$ B

7. $\cos\theta = \frac{1-t^2}{1+t^2}$

$-\frac{3}{5} = \frac{1-t^2}{1+t^2}$

$-3 - 3t^2 = 5 - 5t^2$

$2t^2 = 8$

$t^2 = 4$

$t = \pm 2$

But $0^\circ \le \theta \le 180^\circ$

$0^\circ \le \frac{\theta}{2} \le 90^\circ$

$\therefore t = \tan\frac{\theta}{2} = 2$

$\therefore$ D

8. $\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$

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

$= 2t$

When $t = -3$, $m_T = -6$

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

$y - 11 = -6(x+6)$

$y - 11 = -6x - 36$

$6x + y + 25 = 0$

$\therefore$ A

9. Join OC

Reflex $\angle AOC = 210^\circ$ ($\angle$ at centre is twice $\angle$ at circumference standing on same arc)

Obtuse $\angle AOC = 150^\circ$ ($\angle$'s about a point $= 360^\circ$)

$\angle DCA = 360^\circ - (105 + 40 + 150)^\circ$ ($\angle$ sum of quadrilateral ADCO)

$\angle DCA = 65^\circ$

ΔOCB is isosceles (= radii of circle)

$\angle OCB = 30^\circ$ (= $\angle$'s in isosceles ΔOBC)

$\angle DCE = 180^\circ - (30 + 65)^\circ$ ($\angle$ sum on straight line BCE)

$= 85^\circ \quad \therefore$ C

10. $\tan(p+q) = \dfrac{\tan p + \tan q}{1 - \tan p \tan q}$

$\cot p + \cot q = \dfrac{1}{\tan p} + \dfrac{1}{\tan q}$

$\cot p + \cot q = \dfrac{\tan q + \tan p}{\tan p \tan q}$

$6 = \dfrac{5}{\tan p \tan q}$

$\tan p \tan q = 5/6$

$\therefore \tan(p+q) = \dfrac{5}{1 - 5/6}$

$= \dfrac{5}{\frac{1}{6}}$

$= 30$

$\therefore D$

11. a) $\dfrac{x+3}{x-2} \geq 2 \quad (x \neq 2)$

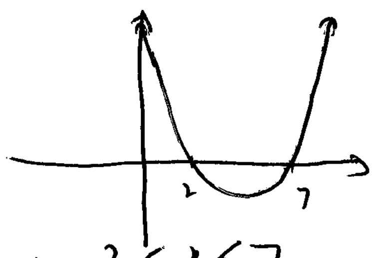
(3) correct answer
(2) obtains correct region but includes $x=2$
(1) Identifies $x=2$ and $x=7$

$(x-2)(x+3) \geq 2(x-2)^2$

$(x-2)[x+3 - 2(x-2)] \geq 0$

$(x-2)(-x+7) \geq 0$

$(x-7)(x-2) \leq 0$



$\therefore 2 < x \leq 7$

11(b) $\cos 2x = 1 - 2\sin^2 x$

$= 1 - 2(\sqrt{3} - 1)^2$

$= 1 - 2(4 - 2\sqrt{3})$

$= -7 + 4\sqrt{3}$

(2) correct answer
(1) substitutes into $\cos 2x$ identity

11(c)

$y = x^3$

$\frac{dy}{dx} = 3x^2$

When $x = 1$ $\frac{dy}{dx} = 3$

$y = x^{-1}$

$\frac{dy}{dx} = -1x^{2}$

$= \frac{-1}{x^2}$

When $x=1$ $\frac{dy}{dx} = -1$

$\tan\theta = \left|\frac{3 - (-1)}{1 + (-1 \times 3)}\right|$

$= \left|\frac{4}{-2}\right|$

$\tan\theta = 2$

$\theta = 63°26'$

$\theta = 63°$ (nearest degree)

(3) correct answer
(2) correct value of $\tan\theta$
(1) calculates gradients of both curves at $x=1$.

(d) $\tan(45° + 30°) = \frac{\tan 45° + \tan 30°}{1 - \tan 45° \tan 30°}$

$= \frac{1 + \frac{1}{\sqrt{3}}}{1 - \frac{1}{\sqrt{3}}}$

$= \frac{\frac{\sqrt{3}+1}{\sqrt{3}}}{\frac{\sqrt{3}-1}{\sqrt{3}}}$

$= \frac{\sqrt{3}+1}{\sqrt{3}-1}$

$= \frac{(\sqrt{3}+1)^2}{3-1}$

$= \frac{(\sqrt{3}+1)^2}{2}$

$= \frac{4+2\sqrt{3}}{2}$

$= 2 + \sqrt{3}$

(3) correct value
(2) attempts to rationalise denominator correctly
(1) substitutes all exact values correctly

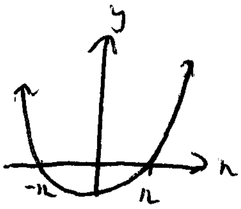
11e) $4x^2+kx+9 \geq 0$

$a=4>0 \quad \Delta \geq 0$

$k^2-4\times4\times9 \geq 0$

$k^2-144 \geq 0$

$-12 \leq k \leq 12$



② correct answer

① attempts to solve $\Delta \leq 0$

11 f) _ _ _ _ _ _

B B B

3 boys in $3! \times 2$ ways

3 girls in $3!$ ways

total = 72 ways

② correct answer

① identifies 6 ways of placing boys at ends

12 a) $2\sin x\cos x = \dfrac{\sin x}{\cos x}$

$2\sin x\cos^2 x - \sin x = 0$

$\sin x\left[2\cos^2 x - 1\right] = 0$

$\sin x = 0$ or $\cos^2 x = \frac{1}{2}$

$x = 0, 180°, 360°$ $\quad \cos x = \pm\frac{1}{\sqrt{2}}$

$x = 45°, 135°, 225°, 315°$

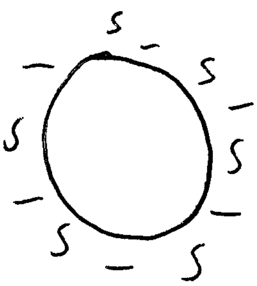
$\therefore x = 0, 45°, 135°, 180°, 225°, 315°, 360°$

③ correct answer

② attempts to solve $\sin x = 0$ or $\cos^2 x = \frac{1}{2}$

① uses double angle identity and attempts to solve

b)



seats 6 students $= (6-1)!$

$= 120$ ways

teachers $= {}^6P_4$ ways

total $= 43200$

② correct answer

① seats students in $5!$ ways

12(c)

$\sqrt{10-x} = x+2$ $\quad (10-x \geq 0)$

$10 - x = x^2 + 4x + 4$ $\quad (x+2 \geq 0)$

$0 = x^2 + 5x - 6$

$(x+6)(x-1) = 0$

But $-2 \leq x \leq 10$

$\therefore$ $x = 1$ is the only solution

(3) correct solution
(2) finds $x = 1$ or -6
(1) squares and attempts to solve

12(d) (i)

$8\cos x - 15\sin x \equiv R\cos(x+\alpha)$

$R = \sqrt{8^2+15^2}$

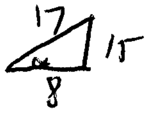
$= \sqrt{289}$

$= 17$

$\frac{8}{17}\cos x - \frac{15}{17}\sin x \equiv \cos x\cos\alpha - \sin x\sin\alpha$

Equating:

$\cos\alpha = \frac{8}{17}$ $\quad \sin\alpha = \frac{15}{17}$



$\tan\alpha = \frac{15}{8}$

$\alpha = 61°55'39.05''$

$\therefore 8\cos x - 15\sin x \equiv 17\cos(x + 61°56')$

(2) correct values for R and α (ignore rounding)
(1) either R or α correct (ignore rounding)

(ii)

$8\cos x - 15\sin x = 7$ $\quad 0 \leq x \leq 360°$

$17\cos(x+\alpha) = 7$ $\quad 61°56' \leq x + 61°56' \leq 421°56'$

$\cos(x+\alpha) = \frac{7}{17}$

$x + \alpha = 309°31'16.71'',\ 410°28'43.69''$

$\therefore x = 248°,\ 349°$

(2) correct answers (ignore rounding)
(1) one correct angle

12(e) (i)

$A(1,7)$ $\quad B(4,2)$

$k \ :\ 1$

$x = \frac{4k+1}{k+1}$ $\quad y = \frac{2k+7}{k+1}$

(1) correct answer

(ii)

$y = 2x+3$

$\frac{2k+7}{k+1} = 2\left(\frac{4k+1}{k+1}\right) + 3$

$2k+7 = 8k+2+3$

$6k = 2$

$k = \frac{1}{3}$ $\quad \therefore 1:3$

(2) correct ratio
(1) substitutes coordinates into equation of line
(1) finds correct point of intersection

13 a)

$$\cos(x+\beta) = b\sin x$$
$$\cos x\cos\beta - \sin x\sin\beta = b\sin x$$
$$\frac{\cos x\cos\beta}{\cos x} = (b+\sin\beta)\frac{\sin x}{\cos x}$$
$$(b+\sin\beta)\tan x = \cos\beta$$
$$\tan x = \frac{\cos\beta}{b+\sin\beta}$$

(2) correct expression
(1) expands $\cos(x+\beta)$ and divides by $\cos x$

b (i)

$$y-3 = mx-2m$$
$$y-3 = m(x-2)$$
$\therefore$ Line passes through $(2,3)$

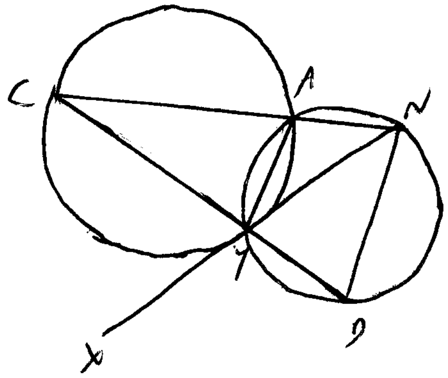
(1) correct answer

(ii)

$$y = mx+3-2m$$
$$\therefore mx+3-2m = x^2+4x-8$$
$$x^2+(4-m)x+2m-11=0$$
To be a tangent
$$\Delta = 0$$
$$(4-m)^2-4(2m-11)=0$$
$$16-8m+m^2-8m+44=0$$
$$m^2-16m+60=0$$
$$(m-10)(m-6)=0$$
$$\therefore m=6 \text{ or } 10$$

(2) correct solution
(1) attempts to solve tangent and line simultaneously.

13(c)



(i) In Δ's CNY and YNA

$\angle N$ is common

$\angle AYN = \angle ACY$ (alternate segment theorem)

$\therefore \Delta CNY ||| \Delta YNA$ (AA)

(2) correct solution
(1) finds one pair of equal angles with reason

(ii) $\angle NAY = \angle NYC$ (matching $\angle$'s in similar Δ's CNY, YNA)

$\angle NYD = 180° - \angle NYC$ ($\angle$ sum of straight line)

$= 180° - \angle NAY$

$\angle NDY = 180° - \angle NAY$ (interior opposite $\angle$'s of cyclic quad ANYD)

$\therefore \angle NDY = \angle NYD$

$\therefore NY = YD$ (equal sides opposite equal $\angle$'s in ΔNDY)

(2) correct solution
(1) finds one pair of equal $\angle$'s

d(i)

$$y = \frac{x+1}{x^2+3}$$

$$\frac{dy}{dx} = \frac{(x^2+3).1 - (x+1)2x}{(x^2+3)^2}$$

$$\frac{dy}{dx} = \frac{-x^2-2x+3}{(x^2+3)^2}$$

(2) correct solution
(1) correct derivative

Cuts x axis when $\frac{x+1}{x^2+3} = 0$

$x+1=0$

$\therefore$ at $x=-1$ $y=0$

when $x=-1$, $\frac{dy}{dx} = \frac{-1+2+3}{16}$

$= \frac{1}{4}$

Equation of tangent

$$y = \frac{1}{4}(x+1)$$

(ii) Stationary points occur when

$$\frac{-(x^2+2x-3)}{(x^2+3)^2} = 0$$

$$(x+3)(x-1) = 0$$

$$x = 1 \text{ or } -3$$

Tangent meets curve when

$$\frac{x+1}{4} = \frac{x+1}{x^2+3}$$

$$(x+1)(x^2+3) = 4(x+1)$$

$$(x+1)(x^2+3-4) = 0$$

$$(x+1)(x^2-1) = 0$$

$$(x+1)^2(x-1) = 0$$

∴ Tangent meets curve again at $x = +1$ which is a stationary point.

(3) correct solution
(2) finds stationary point at $x = 1$ and equates tangent with curve.
or (2) finds tangent meets curve again at $x = 1$
(1) finds stationary point
or (1) attempts to solve where tangent meets curve by equating.

14(a) on next page

14(b)(i) P S V EEEE RR

No. arrangements $= \frac{9!}{4!2!}$

$= 7560$

(2) correct answer
(1) finds 9! as part of answer

(ii) No of ways $= 5!$

$= 120$

(1) correct answer

(iii) P S V EEEE RR

PERSEVERE

Consider EEEERR

no of arrangements are $\frac{6!}{4!2!}$

$= 15$

But only 1 of these is possible

∴ $\frac{1}{15}$ of 7560 = 504 possible ways

(2) correct answer
(1) finds no of arrangements of RREEEE
or (1) significant progress

14a (i) Gradient PQ $= \frac{p^2-q^2}{2p-2q}$

$= \frac{(p-q)(p+q)}{2(p-q)}$

$= \frac{p+q}{2}$

(2) correct solution
(1) finds gradient of chord

Equation of tangent:

$y - p^2 = \frac{p+q}{2}(x-2p)$

$2y - 2p^2 = (p+q)x - 2p(p+q)$

$2y - \cancel{2p^2} = (p+q)x - \cancel{2p^2} - 2pq$

$(p+q)x - 2y - 2pq = 0$

(ii) Equation of tangent:

(2) correct solution
(1) justifies x or y value of T

At P $y = px - p^2$

At Q $y = qx - q^2$

$px - p^2 = qx - q^2$

$(p-q)x = p^2 - q^2$

$(p-q)x = (p+q)(p-q)$

$x = p+q$

$y = p(p+q) - p^2$

$y = p^2 + pq - p^2$

$= pq$

$\therefore$ T is $(p+q, pq)$

(iii) Perpendicular distance:

(3) correct solution
(2) obtains simplified identity involving p and q *
(1) finds perpendicular distance of origin to chord.

$1 = \left|\frac{(p+q)0 - 2\times 0 - 2pq}{\sqrt{(p+q)^2+4}}\right|$

$1 = \left(\frac{2pq}{\sqrt{(p+q)^2+4}}\right)^2$

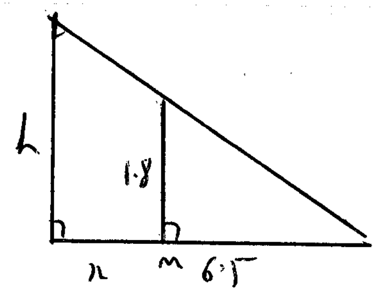
$(p+q)^2 + 4 = 4p^2q^2$ *

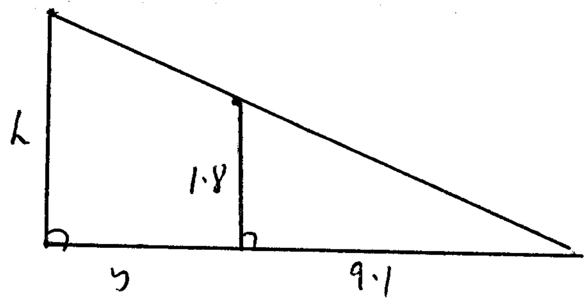
From (ii) $x = p+q$ $y = pq$

$\therefore x^2 + 4 = 4y^2$

$\therefore 4y^2 - x^2 = 4$ is the equation of the locus of T

14(c)



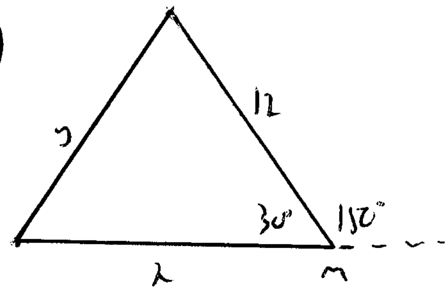


$$\frac{x+6.5}{6.5} = \frac{h}{1.8}$$

$$x+6.5 = \frac{6.5h}{1.8}$$

$$x = 6.5\left(\frac{h}{1.8}-1\right)$$

Similarly $y = 9.1\left(\frac{h}{1.8}-1\right)$



(3) correct answer
(2) finds expressions for side lengths in triangular base and uses cosine rule
(1) finds expression for one side length of triangular base

Using cosine rule

$$9.1^2\left(\frac{h}{1.8}-1\right)^2 = 6.5^2\left(\frac{h}{1.8}-1\right)^2 + 144 - 2\times12\times6.5\left(\frac{h}{1.8}-1\right)\cos 30^\circ$$

let $Q = \frac{h}{1.8}-1$

$$82.81Q^2 - 42.25Q^2 + 78\sqrt{3}Q - 144 = 0$$

$$40.56Q^2 + 78\sqrt{3}Q - 144 = 0$$

$$Q = \frac{-78\sqrt{3} \pm \sqrt{18252+23362.56}}{2\times40.56}$$

$$= 0.8493\ldots$$

$$\frac{h}{1.8} - 1 = 0.8493\ldots$$

$$h = 3.32876\ldots$$

$\therefore$ Height $= 3.33$ m

BAULKHAM HILLS HIGH SCHOOL
YEAR 11 YEARLY 2017
MATHEMATICS EXTENSION 1

FINAL MARK

NAME: ______________________________

Teacher: ______________________________

QN	Part	1	2	4	5	6	9	10	18	Total
MC			1,9		2,3,7,10	4,6	8		5	/10
11	a	3								
	b				2					
	c					3				
	d				3					
	e			2						
	f								2	/15
12	a				3					
	b								2	
	c	3								
	d				4					
	e					3				/15
13	a				2					
	b						3			
	c		5							
	d							5		/15
14	a						7			
	b								5	
	c				3					/15
Total		6	7	2	21	8	11	5	10	70

BAULKHAM HILLS HIGH SCHOOL
YEAR 11 YEARLY
MATHEMATICS EXTENSION 1

Instructions

- Answer Questions 1 – 10 in your booklet. Colour the circle corresponding to your answer.
- Use the appropriate pages in your answer booklet for Questions 11-14.
- Write using black or blue pen. (Black is recommended)
- Write your name on every Question in the answer booklet in the space provided.
- If applicable, write the number of each question part inside the margin at the beginning of each answer.
- You may ask for extra writing paper if you need more space.
  If you use extra writing paper proceed as follows;

  (a) At the end of appropriate answer page, write "CONTINUED ON EXTRA SHEETS"

  (b) On the extra page(s) clearly write your name, the question number and part of the answer being written
- At the conclusion of the exam, staple ALL EXTRA SHEETS AT THE LAST PAGE OF THE APPROPRIATE QUESTION.
  Also place the question sheets inside this booklet.

1. Basic arithmetic and algebra
2. Plane geometry
3. Probability
4. Real functions of a real variable and their geometrical representation
5. Trigonometric ratios – review and some preliminary results
6. Linear functions and lines
7. Series and applications
8. The tangent to a curve and the derivative of a function
9. The quadratic polynomial and the parabola
10. Geometrical applications of differentiation
11. Integration
12. Logarithmic and exponential functions
13. The trigonometric functions
14. Applications of calculus to the physical world
15. Inverse functions and the inverse trigonometric functions
16. Polynomials
17. Binomial theorem
18. Permutations, combinations and further probability