Student Number:

St. Catherine's School
Waverley

2010
Yearly Examination
ASSESSMENT TASK 4
(Weighting 45%)

Mathematics Preliminary
Year 11

General Instructions

- Reading time – 5 minutes
  Working time – 2 hours
- There are 7 questions of equal value.
- Each question is to be answered in a new booklet.
- If any additional booklet is used, please label it clearly and attach it to the appropriate booklet.
- Write using black or blue pen only.
- Board-approved calculators may be used.
- All necessary **working** must be shown.
- Marks may be deducted for careless or badly arranged work.

Total marks – 84

- Attempt all questions.

STUDENT NAME/NUMBER____________________

Total marks – 84
Attempt Questions 1 - 7
All questions are of equal value.

Start each question in a SEPARATE writing booklet. Extra writing booklets are available.

Marks

Question 1. (12 marks)

(a) Evaluate $\sqrt[3]{6.91\times10^{-5}}$ correct to three significant figures. **2**

(b) Factorize $2x^2+x-28$. **2**

(c) Simplify $\frac{2x+3}{3}-\frac{x+2}{4}$. **2**

(d) Express $(2\sqrt{3}+1)(2-\sqrt{3})$ in the form $a\sqrt{3}+b$. **2**

(e) A pair of jeans were discounted by 15% to a selling price of \$63.75. Find the original marked price of the jeans before the discount was applied. **2**

(f) Solve the following inequality. $|3x-5|\geq 2$. **2**

Question 2. (12 marks) Start a new writing booklet.

Marks

(a) Solve the equation $\dfrac{2x-1}{5}=\dfrac{3x+2}{4}$. **2**

(b) Simplify $\dfrac{x^2-9}{x^2+x-12}$. **2**

(c) Consider $f(x)=\begin{cases}-3 & \text{if } x\le -1\\ 2x-3 & \text{if } x>-1\end{cases}$. Evaluate $f(-1)+f(1)$. **1**

(d) Determine whether the function $f(x)=\dfrac{1}{x^2-4}$ is odd, even or neither odd nor even. WORKING MUST BE SHOWN. **1**

(e) **Sketch** graphs of the following functions and state the **domain** of each.

(i) $y=\dfrac{3}{2x-1}$. **2**

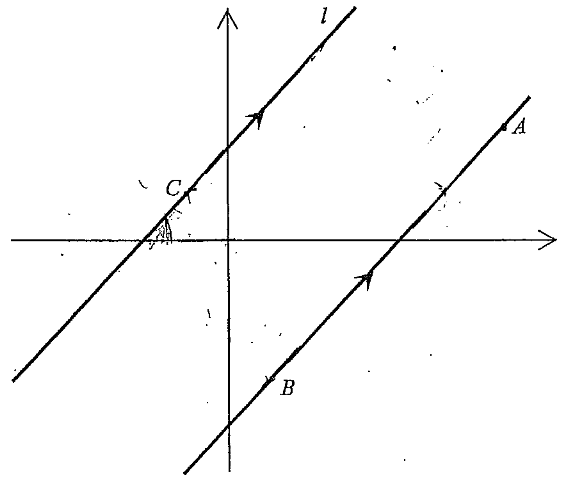
(ii) $y=|2-3x|$. **2**

(f) Solve $2\sin^2 x=1$ where $-180°\le x\le 180°$. **2**

Question 3. (12 marks) Start a new writing booklet.

Marks

(a)



NOT TO SCALE

The line l passes through $C(-1,\ 2)$ and has equation $y=2x+4$.
The point B has coordinates $(1,\ -6)$ and the line AB is parallel to line l.
Copy the diagram into your examination booklet writing the coordinates of B and C onto this diagram.

(i) Find the length of the interval BC. **1**

(ii) Find the midpoint of BC. **1**

(iii) Write down the slope of the line l and find the angle l makes with the positive x–axis. **2**

(iv) Show that AB has equation $y=2x-8$. **1**

(v) If P is a point which lies on AB and on the line $y=2$, find the coordinates of P. **1**

(vi) Find the perpendicular distance of P from the line l. **2**

(vii) Find the size of $\angle ABC$ to the nearest minute. **1**

Question 3 continued on next page.

Question 3. continued. **Marks**

(b) A regular polygon has interior angles measuring $156°$. **1**
How many sides does the polygon have?

(c) The gradient of the tangent to the curve $y = ax^2 - 2x - 14$ is 10 when $x = 2$. **2**
Find the value of a.

Marks

Question 4. (12 marks) Start a new writing booklet.

(a) Consider $f(x) = x^2 - 5x$

(i) Using $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$, differentiate $f(x)$ from first principles. **2**

(ii) Find the gradient of the tangent when $x = 1$. **1**

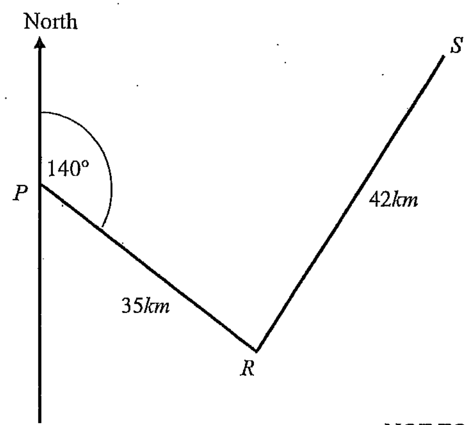
(iii) Find the equation of the normal through the point $(1, -4)$. **2**

(b) Find the exact value of $\cot 330°$. **2**

Marks

Question 4. continued.

(c)



NOT TO SCALE

A tourist drives $35km$ from the town of Pine Vale (P) on a bearing of $140°$ T to the town of Radiatagrove (R).
He then drives $42km$ on a bearing of $38°$ T to the town of Spruceville (S).

Copy this **diagram** into your writing booklet.

(i) Show that $\angle PRS = 78°$. **1**

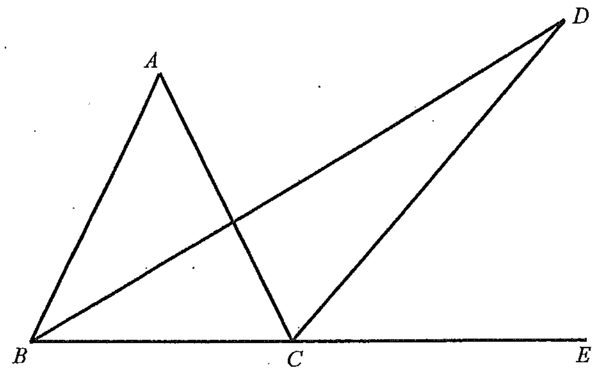
(ii) Show that the distance from Spruceville to Pine Vale (SP) is $49km$, correct to the nearest kilometre. **1**

(iii) Show the size of $\angle SPR = 57°$ to the nearest degree. **1**

(iv) Hence, or otherwise, find the bearing of Pine Vale from Spruceville. Show all necessary working.. **2**

Question 5. (12 marks) Start a new writing booklet. **Marks**

(a)



NOT TO SCALE

ABC is an isosceles triangle in which $AB = AC$ and $\angle BAC = 64°$.
BC is produced to E. BD bisects $\angle ABC$ and CD bisects $\angle ACE$.

Copy or trace the diagram into your writing booklet and mark on it all the given information.

(i) Find the size of $\angle ABC$ giving reasons. **1**

(ii) Find the size of $\angle BDC$ giving reasons. **2**

(b) By expressing $\sec\theta$ and $\tan\theta$ in terms of $\sin\theta$ and $\cos\theta$, show that **1**

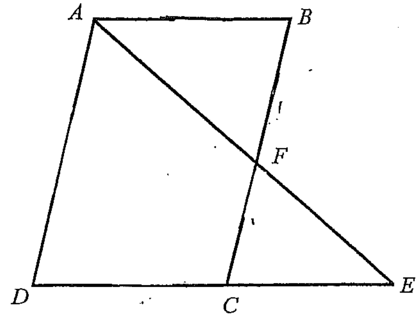
$$\sec^2\theta - \tan^2\theta = 1.$$

(c) If $\sin\theta = -\dfrac{4}{11}$ and $\tan\theta > 0$ find the exact value of $\cos\theta$. **2**

(d) Given the equation $3x^2 + 7x - 4 = 0$ has roots α and β, without finding α or β evaluate $\alpha^2 + \beta^2$. **3**

Question 5. continued. **Marks**

(e)



$ABCD$ is a parallelogram. DC is produced to E. AE cuts BC at F.
$AD = 16cm$, $CE = 9cm$ and $BF = 10cm$.

(i) Prove that ΔABF is similar to ΔECF. **2**

(ii) Find AB. **1**

Question 6. (12 marks) Start a new writing booklet. **Marks**

(a) For the parabola $(x-2)^2 = 8(y+3)$

(i) Find the coordinates of the vertex. **1**

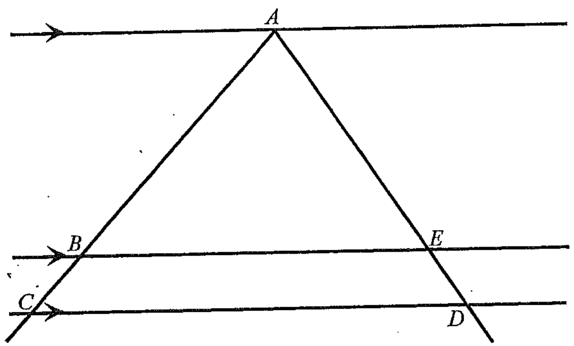
(ii) Find the value of the focal length. **1**

(iii) Find the coordinates of the focus. **1**

(iv) Find the equation of the directrix. **1**

(v) Sketch the parabola labelling the vertex, focus and directrix. **1**

(b)



NOT TO SCALE

$AB = 7cm$, $BC = 4cm$, $ED = 6cm$. Find AD giving reasons. **2**

(c) Express $9x^2 + 2x - 5$ in the form $ax(x+1) + b(x+1) + c$. **3**

(d) For what values of k will the expression $kx^2 - 4x + k$ always be positive? **2**

Question 7. (12 marks) Start a new writing booklet. **Marks**

(a) Evaluate $\lim_{x \to \infty} \frac{3x^2 - 2x - 6}{4 - 2x^2}$. **1**

(b) Find the value of k for which the equation $x^2 - (k+4)x + (k-3) = 0$ has

(i) one root equal to -2. **1**

(ii) roots which are reciprocals of each other. **1**

(iii) roots which are equal in absolute value but opposite in sign. **1**

(c) Find all real numbers x which satisfy the equation $x^4 = 8(x^2 + 6)$. **2**

(d) Differentiate

(i) $\frac{3x^2 - 5}{2x+1}$. **2**

(ii) $\sqrt[5]{(2x+7)^2}$. **2**

(e) Find, as a relationship between a, b and c, the condition for the quadratic equation in x **2**

$$(a^2 - b^2)x^2 + 2b(a-c)x + (b^2 - c^2) = 0$$

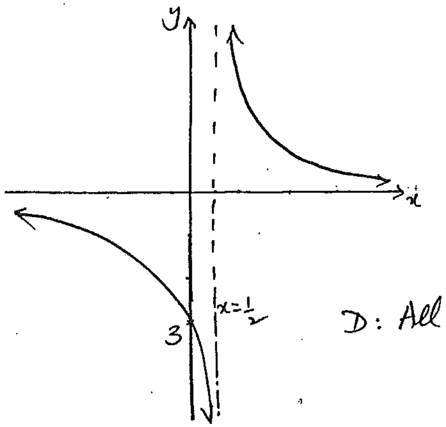
to have equal roots. Simplify your answer as far as possible.

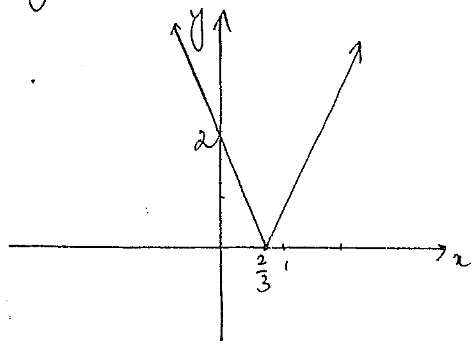
End of paper

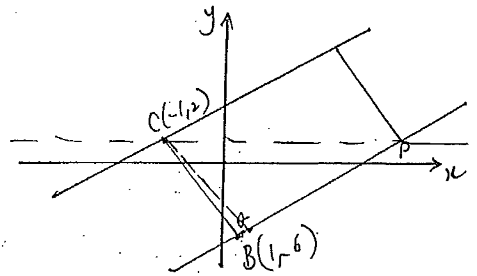
YR11 – END OF PREMILINARY EXAMINATION – 2 unit

Qn	Solutions	Marks	Comments: Criteria
Q1	(a) $\sqrt[3]{6.91 \times 10^{-5}}$		
	$= 0.0410356\ldots$	1	
	$= 0.041$ (to 3 sig. fig.)	1	
	(b) $2x^2 + x - 28$		$-\frac{1}{2}$ sign incorrect.
	$= (2x-7)(x+4)$	2	
	(c) $\frac{2x+3}{3} - \frac{x+2}{4}$		
	$= \frac{4(2x+3) - 3(x+2)}{12}$	1	
	$= \frac{8x + 12 - 3x - 6}{12}$		
	$= \frac{5x+6}{12}$	1	
	(d) $(2\sqrt{3}+1)(2-\sqrt{3})$		$-\frac{1}{2}$ sign incorrect.
	$= 4\sqrt{3} - 6 + 2 - \sqrt{3}$	1	
	$= 3\sqrt{3} - 4$	1	
	(e) $85\% \times \text{cost} = \$63.75$	1	
	Cost $= 63.75 \div 0.85$		
	Cost $= \$75.00$	1	
	(f) $\lvert 3x-5 \rvert \geq 2$		1 mark for each case
	Case 1: $3x - 5 \geq 0$; $3x - 5 \geq 2$; $3x \geq 7$; $x \geq \frac{7}{3}$	2	
	Case 2: $3x - 5 < 0$; $-(3x-5) \geq 2$; $3x - 5 \leq -2$; $3x \leq 3$; $x \leq 1$		

Qn	Solutions	Marks	Comments: Criteria
Q2	(a) $\frac{2x-1}{5} = \frac{3x+2}{4}$		
	$4(2x-1) = 5(3x+2)$		
	$8x - 4 = 15x + 10$	1	
	$8x - 15x = 10 + 4$		
	$-7x = 14$		
	$x = -2$	1	
	(b) $\frac{x^2 - 9}{x^2 + x - 12}$		$-\frac{1}{2}$ incorrect signs.
	$= \frac{\cancel{(x-3)}(x+3)}{\cancel{(x-3)}(x+4)}$	1	
	$= \frac{x+3}{x+4}$	1	
	(c) $f(-1) = -3$		$f(-1)$ $\frac{1}{2}$
	$f(1) = 2(1) - 3$		$f(1)$ $\frac{1}{2}$
	$= -1$		each
	$\therefore f(-1) + f(1)$	1	
	$= -3 + -1$		
	$= -4$		

Qn	Solutions	Marks	Comments: Criteria
Q2(d)	$f(x) = \dfrac{1}{x^2-4}$ $f(a) = \dfrac{1}{a^2-4}$ $f(-a) = \dfrac{1}{(-a)^2-4}$ $= \dfrac{1}{a^2-4} = f(a)$ $\therefore f(x) = \dfrac{1}{x^2-4}$ is an even function	1	
(e)(i)	$y = \dfrac{3}{2x-1}$  D: All real x, $x \neq \frac{1}{2}$	2	1 sketch 1 domain

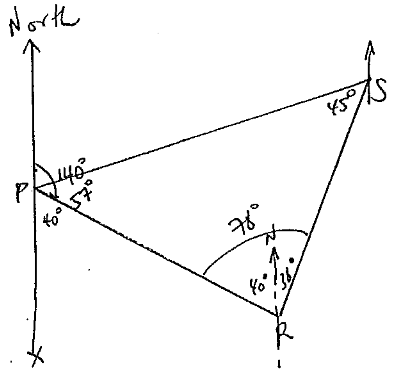
Qn	Solutions	Marks	Comments: Criteria
Q2(e)(ii)	$y = \lvert 2-3x \rvert$  D: For all real x.	2.	1 sketch 1 domain
(f)	$2\sin^2 x = 1$ $\sin^2 x = \frac{1}{2}$ $\sqrt{\sin^2 x} = \pm\sqrt{\frac{1}{2}}$ $\sin x = \pm \frac{1}{\sqrt{2}}$ $\sin x = \frac{1}{\sqrt{2}}$ $x = 45°, 135°$ $\frac{1}{2}$. $\sin x = -\frac{1}{\sqrt{2}}$ $x = -45°, -135°$ $\frac{1}{2}$.	1 1	

Qn	Solutions	Marks	Comments: Criteria
Q3(a)			
(i)	$BC = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $= \sqrt{(1--1)^2+(-6-2)^2}$ $= \sqrt{2^2+(-8)^2}$ $= \sqrt{68}$ $= 2\sqrt{17}$	1	
(ii)	Midpoint of $BC = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ $= \left(\frac{1+-1}{2}, \frac{-6+2}{2}\right)$ $= (0, -2)$	1	
(iii)	$m = 2$ $\tan\theta = 2$ $\therefore \theta = 63^\circ 26'$	1 1	
(iv)	$y - y_1 = m(x - x_1)$ $y + 6 = 2(x - 1)$ $y + 6 = 2x - 2$ $y = 2x - 8$	1	

Qn	Solutions	Marks	Comments: Criteria
Q3(v)	Solve $y = 2$ and $y = 2x - 8$ $2x - 8 = 2$ $2x = 10$ $x = 5$ $\therefore P(5, 2)$	1	
(vi)	$d = \frac{\lvert Ax + By + C \rvert}{\sqrt{A^2+B^2}}$ line $l \Rightarrow 2x - y + 4 = 0$, $P(5,2)$ $d = \frac{\lvert 2(5) - 1(2) + 4 \rvert}{\sqrt{2^2+(-1)^2}}$ $= \frac{\lvert 10 - 2 + 4 \rvert}{\sqrt{4+1}}$ $= \frac{12}{\sqrt{5}}$ $= \frac{12}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$ $= \frac{12\sqrt{5}}{5}$ units		$-1/2$ incorrect signs.
(vii)	$\sin\theta = \frac{12}{\sqrt{5}} \div 2\sqrt{17}$ $\therefore \theta = 40^\circ 36'$	1	

Qn	Solutions	Marks	Comments: Criteria
Q3(b)	each interior angle $= 156°$		
	$\frac{(n-2)180°}{n} = 156°$		
	$(n-2)180 = 156n$		
	$180n - 360 = 156n$		
	$180n - 156n = 360$		
	$24n = 360$	1	
	$n = 15$		
(c)	$y = ax^2 - 2x - 14$		
	$\frac{dy}{dx} = 2ax - 2$ (gradient function)	1	
	at $x = 2$, $\frac{dy}{dx} = 10$		
	i.e. $2ax - 2 = 10$		
	$2a(2) - 2 = 10$		
	$4a - 2 = 10$	1	
	$4a = 12$		
	$a = 3$		

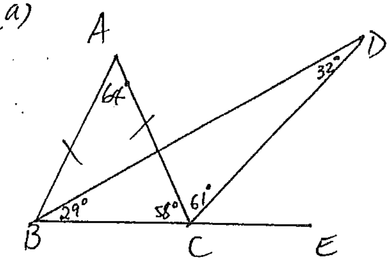
Qn	Solutions	Marks	Comments: Criteria
Q4(a)	$f(x) = x^2 - 5x$		
	(i) $f(x) = x^2 - 5x$		
	$f(x+h) = (x+h)^2 - 5(x+h)$		
	$= x^2 + 2xh + h^2 - 5x - 5h$		
	$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$		
	$= \lim_{h \to 0} \frac{x^2 + 2xh + h^2 - 5x - 5h - (x^2 - 5x)}{h}$	1	
	$= \lim_{h \to 0} \frac{\cancel{x^2} + 2xh + h^2 \cancel{-5x} - 5h \cancel{-x^2} \cancel{+5x}}{h}$		
	$= \lim_{h \to 0} \frac{2xh + h^2 - 5h}{h}$		
	$= \lim_{h \to 0} \frac{\cancel{h}(2x + h - 5)}{\cancel{h}}$	1	
	$= 2x - 5$		
	(ii) when $x = 1$, $f'(x) = 2(1) - 5$		
	$= -3$		
	(iii) gradient of normal is $\frac{1}{3}$		0.5/2
	$y - y_1 = m(x - x_1)$		if found the equation of tangent.
	$y - -4 = \frac{1}{3}(x - 1)$	1	
	$y + 4 = \frac{1}{3}(x - 1)$		
	$3y + 12 = x - 1$	1	
	$x - 3y - 13 = 0$		

Qn	Solutions	Marks	Comments: Criteria
Q4 b)	$\cot 330^\circ$		
	$= \dfrac{1}{\tan 330^\circ}$ ✓		
	$= \dfrac{1}{-\tan 30^\circ}$ ✓	1	
	$= \dfrac{1}{-1/\sqrt{3}}$ ✓		−0.5 mark if negative is not shown
	$= -\sqrt{3}$ ✓	1	
c)			
(i)	$\angle XPR = 180^\circ - 140^\circ$		
	$= 40^\circ$ (adj. supp. ∠s)	1	
	$\angle PRN = 40^\circ$ (alt. ∠s, PX ∥ NR)		
	$\therefore \angle PRS = 40^\circ + 38^\circ$		
	$= 78^\circ$		
(ii)	$SP^2 = 35^2 + 42^2 - 2 \times 35 \times 42 \cos 78^\circ$		
	$SP = \sqrt{35^2 + 42^2 - 2 \times 35 \times 42 \cos 78^\circ}$		
	$= 49$ km	1	
(iii)	$\dfrac{\sin\theta}{42} = \dfrac{\sin 78}{49}$ OR (use of the cosine rule is acceptable.)		
	$\sin\theta = \dfrac{\sin 78}{49} \times 42$	1	
	$\therefore \theta = 57^\circ$		

Qn	Solutions	Marks	Comments: Criteria
Q4 (iv)	$\angle PSR = 180^\circ - (57^\circ + 78^\circ)$ (∠ sum of a △)	1	
	$= 45^\circ$		
	Bearing $= 180^\circ + 38^\circ + 45^\circ$	1	
	$= 263^\circ$		

Qn	Solutions	Marks	Comments: Criteria

Q5 (a)



(i) $\angle ABC = \frac{180° - 64°}{2}$ — 1

$= 58°$ (base $\angle$s of isosc. Δ are equal).

(ii) Since BD bisects $\angle ABC$

$\therefore \angle DBC = \frac{58°}{2}$

$= 29°$ — ½

and $\angle ACB = 58°$ (base $\angle$s of isosc. Δ)

$\therefore \angle ACE = 180° - 58°$

$= 122°$ (adj. supp. $\angle$s) — ½

and since CD bisects $\angle ACE$

$\therefore \angle ACD = 61°$

$\therefore \angle BDC = 180° - (29° + (61° + 58°))$ — 1

$= 32°$ ($\angle$ sum of a Δ)

Comments: −1 mark for not giving reasons

b) LHS $= \sec^2\theta - \tan^2\theta$

$= \frac{1}{\cos^2\theta} - \frac{\sin^2\theta}{\cos^2\theta}$ — 1

$= \frac{1 - \sin^2\theta}{\cos^2\theta}$

$= \frac{\cos^2\theta}{\cos^2\theta}$

$= 1 =$ RHS

Comments: −0.5 if solution is not in ~~terms~~ of $\cos\theta$ & $\sin\theta$

Qn	Solutions	Marks	Comments: Criteria

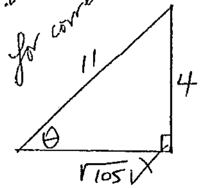
Q5 c) $\sin\theta = -\frac{4}{11}$ (3rd or 4th)

$\tan\theta > 0$ (1st or 3rd)

$\therefore \theta$ in 3rd quad ½✓

$\cos\theta = -\frac{\sqrt{105}}{11}$ ✓½ — 2

+½ for correct ratio



Comments: −0.5 if not exact form

(d) $3x^2 + 7x - 4 = 0$

$\alpha + \beta = -\frac{b}{a}$ $\qquad$ $\alpha\beta = \frac{c}{a}$

$= -\frac{7}{3}$ ½ $\qquad$ $= \frac{-4}{3}$ ½

$(\alpha + \beta)^2 = \alpha^2 + 2\alpha\beta + \beta^2$

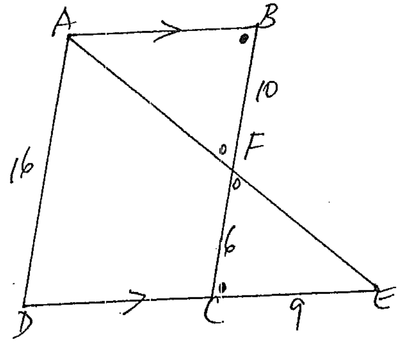
$\therefore \alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$ ✓ — 3

$= \left(-\frac{7}{3}\right)^2 - 2\left(-\frac{4}{3}\right)$

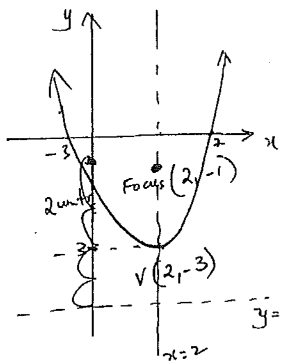
$= \frac{49}{9} + \frac{8}{3}$ ½

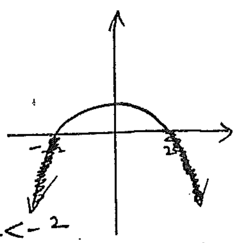
$= 8\frac{1}{9}$ ✓½

(e)



Qn	Solutions	Marks	Comments: Criteria
Q5(c)(i)	In ΔABF & ΔECF, we have $\angle AFB = \angle EFC$ (vert. opp. $\angle$s) ✗ $\angle ABF = \angle ECF$ (alt $\angle$s, $AB \parallel DE$) ✓ $\therefore \Delta ABF \mathrel{\vert\vert\vert} \Delta ECF$ (equiangular) ✗	2	
(ii)	$FC = 16 - 10$ $= 6$ (opp. sides of parallelogram) $\frac{AB}{CE} = \frac{BF}{CF}$ (corresponding sides of 2 similar Δs) $\frac{AB}{9} = \frac{10}{6}$	1	
	$6AB = 90$ $AB = \frac{90}{6}$ $\therefore AB = 15$ cm		

Qn	Solutions	Marks	Comments: Criteria
Q6(a)	$(x-2)^2 = 8(y+3)$		
(i)	$V(2,-3)$	1	
(ii)	$4a = 8$ $a = 2$	1	
(iii)	 Focus $(2,-1)$	1	
(iv)	Directrix : $y = -5$	1	
(v)	see part (iii)	1	
(b)	$\frac{AE}{ED} = \frac{AB}{BC}$ ($\parallel$ lines cut off intercepts in the same ratio) $\frac{AE}{6} = \frac{7}{4}$ $4AE = 42$ $AE = 10\frac{1}{2}$	1	
	$\therefore AD = AE + ED$ $= 10\frac{1}{2} + 6$ $= 16\frac{1}{2}$ cm	1	

Qn	Solutions	Marks	Comments: Criteria
Q6(c)	$9x^2+2x-5 = ax(x+1)+b(x+1)+c$ $= ax^2+ax+bx+b+c$ $= ax^2+x(a+b)+b+c$ $\boxed{a=9}$ $a+b=2$ $9+b=2$ $b=2-9$ $\boxed{b=-7}$ $b+c=-5$ $-7+c=-5$ $c=-5+7$ $\boxed{c=2}$ $9x^2+2x-5=9x(x+1)-7(x+1)+2$	3	
(d)	kx^2-4x+k (positive definite $\therefore k>0$ and $\Delta<0$) $\Delta = b^2-4ac$ $=(-4)^2-4k.k$ $=16-4k^2$ $16-4k^2<0$ $4(4-k^2)<0$ $4(2-k)(2+k)<0$  $k>2$ or $k<-2$ because $k>0$ $\therefore$ solution is $k>2$	2	

Qn	Solutions	Marks	Comments: Criteria
Q7(a)	$\lim_{x\to\infty} \frac{3x^2-2x-6}{4-2x^2}$ $=\lim_{x\to\infty} \frac{\frac{3x^2}{x^2}-\frac{2x}{x^2}-\frac{6}{x^2}}{\frac{4}{x^2}-\frac{2x^2}{x^2}}$ $=\lim_{x\to\infty} \frac{3-\cancel{\frac{2}{x}}^{\to 0}-\cancel{\frac{6}{x^2}}^{\to 0}}{\cancel{\frac{4}{x^2}}^{\to 0}-2}$ $=\frac{3}{-2}$	1	Some have $-\frac{6}{4}$ from $\frac{3x^2-2x-6}{4-2x^2}$ $\times$ $\frac{0}{}$ $\frac{3}{2}$ $\frac{1}{2}$m.
(b)	$x^2-(k+4)x+(k-3)=0$		
(i)	If one of the roots is -2 then $x=-2$ must satisfy the equation i.e. $(-2)^2-(k+4)(-2)+k-3=0$ $4+2(k+4)+k-3=0$ $4+2k+8+k-3=0$ $3k+9=0$ $k=-\frac{9}{3}$ $k=-3$	1	
(ii)	Let the roots be α & $\frac{1}{\alpha}$ $\alpha.\frac{1}{\alpha}=\frac{c}{a}$ $1=\frac{k-3}{1}$ $\therefore k=4$	1	

Qn	Solutions	Marks	Comments: Criteria
Q7 (b) (iii)	Let the roots be α & $-\alpha$		
	$\alpha + (-\alpha) = -\frac{b}{a}$		
	$\alpha - \alpha = -\frac{b}{a}$		
	$0 = -\frac{-(k+4)}{1}$	1	
	$k+4=0$		
	$\therefore k=-4$		
(c)	$x^4 = 8(x^2+6)$		
	$x^4 = 8x^2+48$		
	$x^4-8x^2-48=0$		
	Let $m=x^2$		
	$m^2-8m-48=0$	2	
	$(m-12)(m+4)=0$		$x=\pm\sqrt{12}$.
	$m=12$ or $m=-4$		if $x=\sqrt{12}$ $(-\frac{1}{2}m)$
	$x^2=12$ $\quad$ $x^2=-4$ no real solution		
	$x=\pm\sqrt{12}$		
	$\therefore x=\pm 2\sqrt{3}$		

Qn	Solutions	Marks	Comments: Criteria
Q7(d) (i)	$\frac{d}{dx}\left(\frac{3x^2-5}{2x+1}\right)$		
	let $u=3x^2-5$, $u'=6x$ $\mid$ $v=2x+1$, $v'=2$		
	$\frac{d}{dx}\left(\frac{3x^2-5}{2x+1}\right) = \frac{u'v-v'u}{v^2}$	2	
	$=\frac{6x(2x+1)-2(3x^2-5)}{(2x+1)^2}$	1	
	$=\frac{12x^2+6x-6x^2+10}{(2x+1)^2}$		
	$=\frac{6x^2+6x+10}{(2x+1)^2}$	1	
(ii)	$\frac{d}{dx}\left(\sqrt[5]{(2x+7)^2}\right)$		
	$=\frac{d}{dx}\left((2x+7)^{\frac{2}{5}}\right)$ $\quad \frac{1}{2}$		
	$=\frac{2}{5}(2x+7)^{\frac{2}{5}-1}\cdot 2$ $\quad \frac{1}{2}$	2	
	$=\frac{4}{5}(2x+7)^{-\frac{3}{5}}$ $\quad 1$		
	$=\frac{4}{5\sqrt[5]{(2x+7)^3}}$		

Qn	Solutions	Marks	Comments: Criteria
Q7(a)	For the quad. equ. to have equal roots $\Delta = 0$ i.e. $b^2 - 4ac = 0$ $[2b(a-c)]^2 - 4(a^2-b^2)(b^2-c^2) = 0$ ✓½ $4b^2(a-c)^2 - 4(a^2b^2 - a^2c^2 - b^4 + b^2c^2) = 0$ $4b^2(a^2 - 2ac + c^2) - 4a^2b^2 + 4a^2c^2 + 4b^4 - 4b^2c^2 = 0$ $\cancel{4a^2b^2} - 8ab^2c + \cancel{4b^2c^2} - \cancel{4a^2b^2} + 4a^2c^2 + 4b^4 - \cancel{4b^2c^2} = 0$ $-8ab^2c + 4a^2c^2 + 4b^4 = 0$ ½✓ $4(b^4 - 2acb^2 + a^2c^2) = 0$ $4(b^2 - ac)^2 = 0$ $(b^2 - ac)^2 = 0$ ✓½ $b^2 - ac = 0$ $b^2 = ac$ ✓½	2	