Pearson Edexcel

Mark Scheme (Results)

Summer 2022

Pearson Edexcel International GCSE
In Mathematics B (4MB1)
Paper 02R

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2022
Question Paper Log Number P69310A
Publications Code 4MB1_02R_2206_MS
All the material in this publication is copyright
© Pearson Education Ltd 2022

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
  Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - awrt – answer which rounds to
  - eeoo – each error or omission
- **No working**
  If no working is shown then correct answers normally score full marks
  If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

  If the final answer is wrong always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

  If there is a choice of methods shown, then award the lowest mark, unless the subsequent working makes clear the method that has been used.

  If there is no answer achieved then check the working for any marks appropriate from the mark scheme.

- **Ignoring subsequent work**

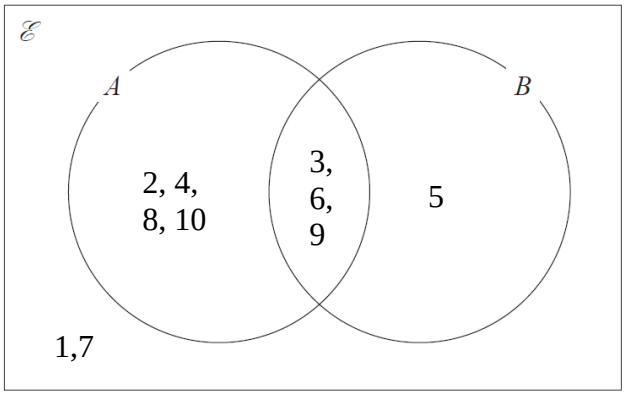
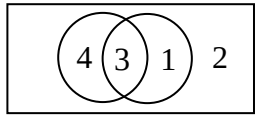
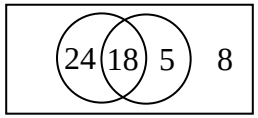
  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

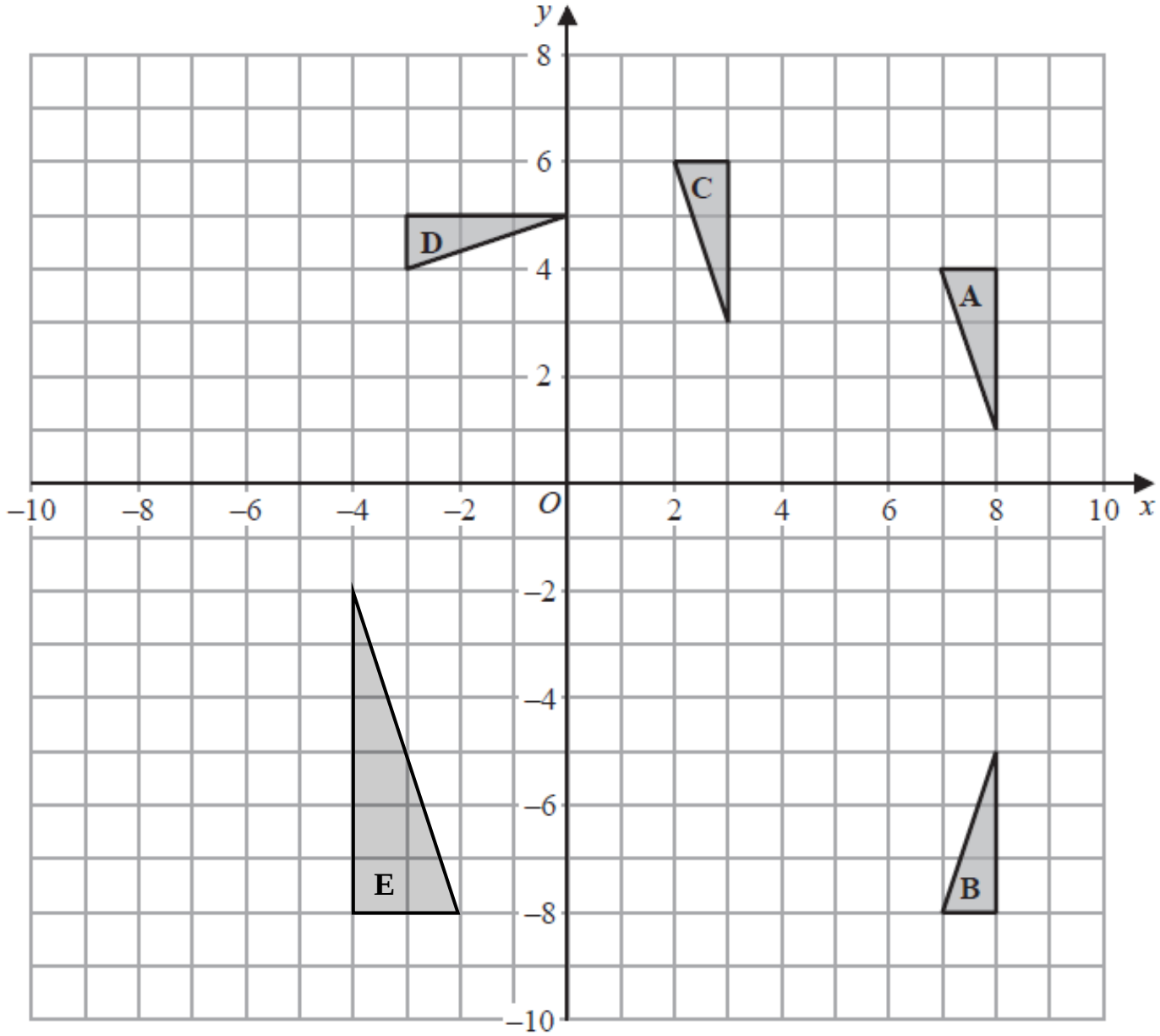
  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

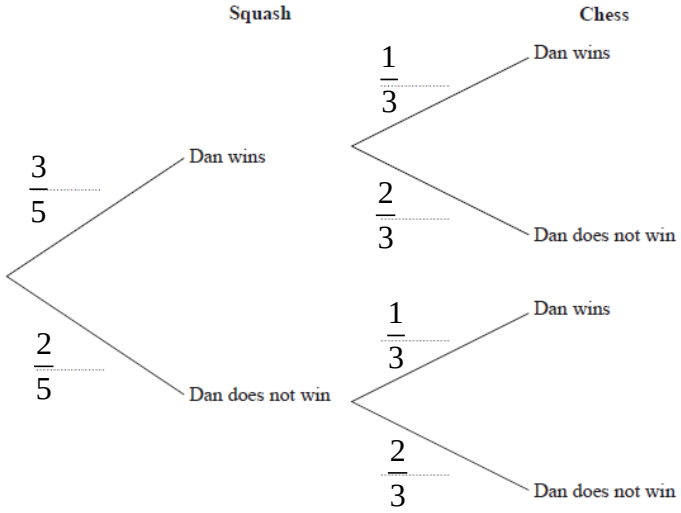
Question		Working	Answer	Mark	Notes
1	(a)		41	1	B1
	(b)		29	1	B1
	(c)		Correct region shaded	1	B1 The region containing the 15 and 12 only
	(d)		Correct Venn diagram	3	B3 all correct with no extra values B2 for three regions correct or 9 items placed correctly with one value in the wrong section or all values correctly placed with some extra value(s) seen B1 for one or two regions correct or for values correctly placed in three regions with extra value(s) (not from 1-10) seen SC B1 for either of:  
	(e)		4	1	B1 or ft their Venn diagram NB do not ft n(B) = 0
					Total 7 marks

2		$\frac{360}{16}$ [= 22.5] or $180-\frac{(16-2)\times 180}{16}\left[=180-157.5\right]$			M1 for calculating the exterior angle of 16-sided regular polygon accept 22.5 seen on diagram.
		$\cos'22.5'=\frac{\frac{1}{2}AC}{5}$ or $AC^2=5^2+5^2-2(5)(5)\cos(180-2\times'22.5')$ or $\frac{\sin'22.5'}{5}=\frac{\sin(180-2\times'22.5')}{AC}$			M1 for obtaining an eq containing $\frac{1}{2}AC$ or AC give bod if labelled as other variable eg. x ft their exterior angle, must be < 90 (correct angle $\angle ABC$ = 135° NB allow if the final answer rounds to 9.2 (2sf), with no incorrect working seen.
		$AC=2(5\cos'22.5')$ or $AC=\sqrt{5^2+5^2-2(5)(5)\cos(180-2\times'22.5')}$ or $AC=\frac{5\sin'135'}{\sin 22.5}$			M1 dep for an expression for AC NB allow if the final answer rounds to 9.2 (2sf), with no incorrect working seen.
			9.24	4	A1 accept awrt 9.23 or 9.24 accept answer shown on diagram
					Total 4 *marks*

3	(a)	<table><tr><th>Time delay</th><th>Freq</th><th>Angle</th></tr><tr><td>$1 < t \leqslant 5$</td><td>42</td><td>168</td></tr><tr><td>$5 < t \leqslant 10$</td><td>23</td><td>92</td></tr><tr><td>$10 < t \leqslant 20$</td><td>15</td><td>60</td></tr><tr><td>$20 < t \leqslant 25$</td><td>8</td><td>32</td></tr><tr><td>$25 < t \leqslant 40$</td><td>2</td><td>8</td></tr></table>		2	B2 for all four correct entries B1 for any two or three correct entries
	(b)	$(3\times 42)+(7.5\times '23')+(15\times 15)+(22.5\times '8')+$ $(32.5\times 2)[=126+172.5+225+180+65=768.5]$			M2 for at least 3 correct products added (may ft their frequencies and need not be evaluated) if ft frequencies must be positive integers M1 for use of a value within interval (include end points) for at least 4 products which must be added **OR** correct mid-points used for at least 3 products but not added If the correct total is not seen and no indication of addition seen then if a total between 510 and 1200 inclusive is seen or used implies addition of their products, products must be seen and still need to use appropriate values with the ranges.
		'768.5' ÷ (42+'23'+15+'8'+2)			M1dep on at least M1 gained for their total *fm* divided by their total *f*
			8.54	4	A1 awrt 8.54
					Total 6 *marks*

4	(a)		reflection		B1 Accept reflect do not accept mirror. NB do not award any marks in this part if 2 transformations listed
			$y = -2$	2	B1 for equation of correct line
	(b)		translation		B1 Accept translate do not accept move or transformation. NB do not award any marks in this part if 2 transformations listed
			$\begin{pmatrix} -5 \\ 2 \end{pmatrix}$	2	B1 do not accept anything other than a vector for this mark.
	(c)		rotation		B1 Accept rotate do not accept turn Give bod if rotation and another transformation listed
			90° [anticlockwise]		B1 oe (e.g. 270° clockwise or -270°) Do not allow 90° clockwise, -90° or -90° anticlockwise. Give bod if rotation and another transformation listed
			[about] $(2, -1)$	3	B1 for centre $(2, -1)$ NB do not award this mark if 2 transformations listed
	(d)	Triangle with vertices at $(-4, -2), (-4, -8)$ and $(-2, -8)$	Triangle *E*	2	B2 for correct triangle *E* B1 for two correct vertices plotted or triangle enlarged about (4, 0) with any scale factor (allow the points (12,2), (12,8) and (10,8) if grid extended or points labelled) or triangle enlarged with correct scale factor about any point or if three correct coordinate stated either as coordinates, position vectors or a 3×2 matrix.
					Total 9 *marks*


y
8
6
4
2
−10
−8
−6
−4
−2
O
2
4
6
8
10
x
−2
−4
−6
−8
−10
A
B
C
D
E

5	(a)				B1 for correct first set of branches (squash) B1 for correct second set of branches (Chess)
	(b)	$\left(\frac{3}{5}\times\frac{2}{3}\right)+\left(\frac{2}{5}\times\frac{1}{3}\right)$ or $1-\left(\frac{3}{5}\times\frac{1}{3}\right)-\left(\frac{2}{5}\times\frac{2}{3}\right)$ oe			M1 Correct expression for the probability of winning once. Allow correct values or ft their tree diagram. Do not ft any probability which is >1 or negative.
			$\frac{8}{15}$	2	A1 (oe) accept awrt 0.533 NB if candidates probabilities incorrectly ordered on their tree this mark may still be awarded. Otherwise correct answer from incorrect working (eg $\frac{3}{5}\times\frac{1}{3}+\frac{1}{3}=\frac{8}{15}$) gains M0A0
	(c)	$\frac{\left(\frac{3}{5}\times\frac{2}{3}\right)}{\frac{8}{15}}$			M1 for correct product (correct or ft their tree diagram) divided by their answer to part (b) Do not ft any probability which is >1 or negative.
			$\frac{3}{4}$	2	A1 (oe)
					Total 6 *marks*

<table>
<tr><td>6</td><td>(a)</td><td>$\frac{460}{2+5+3}\times(5+3)$ oe</td><td></td><td></td><td>M1 complete method to find the required number of members.</td></tr>
<tr><td></td><td></td><td></td><td>368</td><td>2</td><td>A1</td></tr>
<tr><td></td><td>(b)</td><td>$\left(\frac{3}{10}\times460\right)\times65+\left(\frac{7}{10}\times460\right)\times135$ or
92 × 135 + 230 × 135 + 138 × 65 or
12 420 + 31 050 + 8970 oe</td><td></td><td></td><td>M1 complete method to find the fees. Give bod for addition of values if a list of values seen with “total” oe seen with a larger value.
Correct values which you may see:
<table><tr><td></td><td>Members</td><td>Fees</td></tr><tr><td><30</td><td>92</td><td>12 420</td></tr><tr><td>30-60</td><td>230</td><td>31 050</td></tr><tr><td>>60</td><td>138</td><td>8 970</td></tr><tr><td>>30</td><td>368</td><td>40 020</td></tr><tr><td><60</td><td>322</td><td>43 470</td></tr></table></td></tr>
<tr><td></td><td></td><td></td><td>($)52 440</td><td>2</td><td>A1 allow ($) 52 400</td></tr>
<tr><td></td><td>(c)</td><td>65×1.04 or 65 + 2.6 oe</td><td></td><td></td><td>M1 complete method to increase by 4% if 67.6 is seen embedded with work award this mark or a final answer of 9328.8[0], 9329 (total fees after increase)</td></tr>
<tr><td></td><td></td><td></td><td>($)67.60</td><td>2</td><td>A1 allow ($)67.6</td></tr>
<tr><td></td><td>(d)</td><td>$\left(\frac{12(0.5)-5.10}{5.10}\right)\times100$ or $\frac{12\times0.5}{5.1}\times100-100$ or
$\left(\frac{0.5-\frac{5.10}{12}}{\frac{5.10}{12}}\right)\times100$ or $\frac{0.075}{0.425}\times100$ oe</td><td></td><td></td><td>M1 Correct method to find percentage profit
Correct values which you may see:
<table><tr><td>Shuttles</td><td>Sold</td><td>Cost</td><td>Profit</td></tr><tr><td>1</td><td>50c</td><td>0.425c</td><td>0.075c</td></tr><tr><td>12</td><td>$6</td><td>$5.10</td><td>$0.90</td></tr></table></td></tr>
<tr><td></td><td></td><td></td><td>17.6(%)</td><td>2</td><td>A1 awrt 17.6
(for reference: 17.647058… so also allow 17.65)</td></tr>
</table>

	(e)	$155 \rightarrow LB = 154.5, UB = 155.5$ $76 \rightarrow LB = 75.5,\ UB = 76.5$ $610 \rightarrow LB = 609.5, UB = 610.5$			B1 for any one correct *LB* or *UB* seen allow 155.49[9…] or 610.49[9…]
		$(155.5 - 75.5) \times 610.5$			M1 for using ($UB_1 - LB$) × UB_2 if not stated as such accept values in the intervals $155 < UB_1 \leqslant 155.5$, $75.5 \leqslant LB < 76$ and $610 < UB_2 \leqslant 610.5$
			48 840	3	A1 allow awrt 48 800 must use 155.5 or 155.49[9…], 75.5 and 610.5 or 610.49[9…] only
					Total 11 *marks*

7	(a)		3.42, 2.67, 3.05	2	B2 All values correct to 2 dp. B1 At least 2 values correct to at least 1dp. Allow awrt 3.4, 2.7 and 3.0 or 3.1
	(b)		Curve drawn	3	M1 Attempts to plot at least 7 of their points with at least 5 correct ±1 small square. (Allow if curve goes through the points) ft their values from (a) M1 drawing a smooth curve through at least 5 of their plotted points. Do not allow if straight lines used. Allow ±1 small square from their point. A1ft A fully correct curve ft their values from (a). All Points plotted correctly, ± 1 small square, with a smooth curve through all the points ±1 small square.
	(c)		3.1 ± 0.1	1	B1ft their graph (answer must be consistent with their graph ±1 small square) penalise answers given to more than 2 dp
	(d)		$\frac{2t}{27}$ or $-6t^{-3}$		M1 for attempt to differentiate with one term in *t* correct
			$[a =]\frac{2t}{27} - 6t^{-3}$	2	A1 oe penalise if extra terms seen (eg. $a = \frac{2t}{27} + 2 - 6t^{-3}$)
	(e)	$\frac{2t}{27} - \frac{6}{t^3} = 0$			M1 for setting their *a* equal to 0
		$2t^4 = 162 \Rightarrow t^4 = 81$			M1 dep for obtaining an equation in form $t^a = b$ where $a > 0$
			3	3	A1 both method marks must be awarded an answer of 3 with no clear algebraic working seen gains no marks, condone ±3
					Total 11 *marks*

8	(a)		$(0, 2)$		B1 allow unambiguous equivalent eg. $y = 2$ or cross y axis at 2
			$\left(\frac{2}{3}, 0\right)$	2	B1 allow unambiguous equivalent eg. $x = \frac{2}{3}$ or cross x axis at $\frac{2}{3}$ must be exact but isw if a decimal is given after an exact answer. Allow $0.\dot{6}$ oe
	(b)		$\frac{1}{5}$	1	B1 (oe)
	(c)	$\text{ff}(x) = \text{f}(2-3x) = 2-3(2-3x)\left(=9x-4\right)$			B1 for correct (unsimplified) expression for ff(x) or ff (y) may be seen embedded within working
		$'9x-4'+\frac{3+x}{1-2x}=0$			M1 for setting their ff(x) + g(x) = 0 ff(x) must be algebraic
		$18x^2-18x+1=0$ oe			A1 for obtaining a correct 3-term quadratic in x.
		$x=\frac{-'-18'\pm\sqrt{('-18')^2-4('18')[('1')]}}{2('18')}$			M1 for solving their 3-term quadratic using either the formula or completing the square only (so not factorising) allow one sign error.
			$x=\frac{3\pm\sqrt{7}}{6}$	5	A1 must have awarded the first A mark allow equivalent expressions in the form $x=\frac{a\pm\sqrt{b}}{c}$ where a, b and c are integers eg. $x=\frac{18\pm\sqrt{252}}{36}$

	(d)	$\left[\text{fg}(x)=\text{f}\left(\frac{3+x}{1-2x}\right)=\right]2-3\left(\frac{3+x}{1-2x}\right)\left[=\frac{7x+7}{2x-1}\right]$			M1 for correct order of operations for the composite function fg(x)
		$y(2x-1)=7x+7$ or $(y-2)(1-2x)=-3(3+x)$ oe			M1 for removing fraction from their y = fg (x) or their x = fg (y)
		$2xy-7x=7+y$ oe			M1dep on previous M mark for collecting terms in x or y as appropriate allow one sign or arithmetic error.
		$x(2y-7)=7+y$ oe			M1 for factorising allow one sign or arithmetic error.
			$\left[\text{f g}^{-1}:x\mapsto\right]\frac{7+x}{2x-7}$	5	A1 (must be in terms of x) oe e.g. $\frac{-x-7}{7-2x}$
	(d) ALT using $g^{-1}f^{-1}$	$y(1-2x)=3+x$			M1 oe for removing fraction from g(x)
		$y-3=x+2xy \Rightarrow y-3=x(1+2y)$			M1dep for collecting terms in x and factorising
		$\left[\text{g}^{-1}(x)=\right]\frac{x-3}{1+2x}$			M1 oe correct expression for $g^{-1}(x)$
		$\left[\text{g}^{-1}\text{f}^{-1}(x)=\right]\frac{\left(\frac{2-x}{3}\right)-3}{1+2\left(\frac{2-x}{3}\right)}$			M1oe for correct order of operations for the composite function $g^{-1}f^{-1}(x)$ using their $g^{-1}(x)$ $f^{-1}(x)$
			$\left[\text{f g}^{-1}:x\mapsto\right]\frac{7+x}{2x-7}$	(5)	A1 (must be in terms of x) oe e.g. $\frac{-x-7}{7-2x}$
					Total 13 *marks*

9	(a)(i)		$\frac{5}{3}\mathbf{b}$		B1 oe accept $1\frac{2}{3}\mathbf{b}$ do not accept $\mathbf{b}+\frac{2}{3}\mathbf{b}$
	(ii)	$\overrightarrow{CO}=-\overrightarrow{AC}-\mathbf{a}$			M1 an expression for $\overrightarrow{CO}$, allow epressions not in terms of **a** and **b** eg. *CO = CA + AD + DO*
			$-\frac{5}{3}\mathbf{b}-\mathbf{a}$		A1 ft their vector $\overrightarrow{AC}$ given in terms of **a** and **b** allow $-\frac{5\mathbf{b}-3\mathbf{a}}{3}$
	(iii)		$-2\mathbf{a}-\mathbf{b}$	4	B1
	(b)	$\overrightarrow{AE}=\overrightarrow{AD}+\overrightarrow{DE}=\mathbf{b}+\mu\left('-\mathbf{b}-2\mathbf{a}'\right)$			M1 with $\overrightarrow{AD}$ and their vector $\overrightarrow{DB}$ must include an unknown parameter.
		$\overrightarrow{AE}=\overrightarrow{AC}+\overrightarrow{CE}='\frac{5}{3}\mathbf{b}'+\lambda\left('-\frac{5}{3}\mathbf{b}-\mathbf{a}'\right)$			M1 with their vector $\overrightarrow{CO}$ and their vector $\overrightarrow{AC}$ must include an unknown parameter.
		$'\frac{5}{3}\mathbf{b}+\lambda\left(-\frac{5}{3}\mathbf{b}-\mathbf{a}\right)'='\mathbf{b}+\mu\left(-\mathbf{b}-2\mathbf{a}\right)'$ $\Rightarrow '\frac{5}{3}'-'\frac{5}{3}'\lambda='1'-'1'\mu$ and $'-1'\lambda='-2'\mu$			M1 dep both previous M marks, for setting expressions equal (to each other) and forming two equations in their parameters allow a maximum of one sign error or missing term
		$\mu=\frac{2}{7},\lambda=\frac{4}{7}$			A1 for either parameter correct, is implied by a correct final vector.
		e.g. $\overrightarrow{AE}=\mathbf{b}+\frac{2}{7}\left(-\mathbf{b}-2\mathbf{a}\right)$	$-\frac{4}{7}\mathbf{a}+\frac{5}{7}\mathbf{b}$	5	A1oe eg. $\frac{5\mathbf{b}-4\mathbf{a}}{7}$

	(c)	$AB = 14,\ AC = '\frac{5}{3}' \times 6 [= 10]$			M1 Values 14 and 10 stated or used ft their $\overrightarrow{AC}$
		$BC = \sqrt{'14'^2 - '10'^2}\ [= 4\sqrt{6}]$ or $\cos BAC = \frac{'10'}{14} [\Rightarrow BAC = 44.4]$			M1 for correct use of Pythagoras with their *AC* and *AB* or a correct method to find a trig ratio of $\angle BAC$
		[Area =] $\frac{1}{2}('10')('4\sqrt{6}')$ or $\frac{1}{2}('10')('14')\sin('44.4')$			M1 for correct formula for the area of *ABC* allow even if the method will not give an exact answer (allow for awrt 49.0 with no incorrect working seen) allow alternative methods not covered by the specification such as $S = \frac{'10' + '14' + '4\sqrt{6}'}{2}$ and Area = $\sqrt{S(S-'10')(S-'14')(S-'4\sqrt{6}')}$
			$20\sqrt{6}$	4	A1 oe (provided exact) eg $\sqrt{2400}$ isw if an exact answer in form $a\sqrt{b}$ or $\sqrt{a}$ is given followed by a decimal answer.
					Total 13 *marks*

10	(a)	$[\det \mathbf{A} =]2k^2(k+1)-(-3k)(k-9)$ $[=2k^3+5k^2-27k]$ $[\det \mathbf{B} =]k-3(-5)[=k+15]$			M1 for at least one correct (may be unsimplified) determinant of **A** or **B**
		$'2k^3+5k^2-27k'='k+15'$			M1 dep for equating their (may be unsimplified) determinants (both correct).
			$2k^3+5k^2-28k-15=0$	3	A1 cao no incorrect working seen and both M marks awarded. NB we must see the full equation including = 0
	(b)	$2(-5)^3+5(-5)^2-28(-5)-15$			M1 Attempt to find f (±5) (M0 if long division used)
		$2(-5)^3+5(-5)^2-28(-5)-15=0$	$\therefore$ ($\boldsymbol{x}$ + 5) is a factor	2	A1 Find f(–5) must see working (at least as shown here) and have " = 0"

	(c)	$\left[(k+5)\right]\left(2k^2-5k-3\right)$ or $\begin{array}{c\|cccc} -5 & 2 & 5 & -28 & -15 \\ & & -10 & 25 & 15 \\ \hline & 2 & -5 & -3 & 0 \end{array}$			M1 (Gain any two terms of the quadratic factor.) May be seen as part of long division or synthetic long division (in which case look for two correct non zero terms on the bottom row) May be awarded from part (b).
		$\left[(k+5)\right]\left(2k^2-5k-3\right)$			A1 fully correct quadratic factor, may be awarded from part (b).
		$\left(2k^2-5k-3\right)=(2k+1)(k-3)$			M1 dep on previous M mark for their $\left(2k^2-5k-3\right)$ factorised, their factorised form must expand to give 2 terms of their quadratic
			$(k+5)(2k+1)(k-3)$	4	A1 Fully correct solution with no incorrect working seen gains full marks. isw if cubic is solved but must see 3 factors to gain this mark. Allow $2(k+5)\left(k+\frac{1}{2}\right)(k-3)$ Do not allow $(k+5)\left(k+\frac{1}{2}\right)(k-3)$
	(d)	$\mathbf{A}=\begin{pmatrix} 2\times'3'^2 & '3'-9 \\ -3\times'3' & '3'+1 \end{pmatrix}\left[=\begin{pmatrix} 18 & -6 \\ -9 & 4 \end{pmatrix}\right]$ $\mathbf{B}=\begin{pmatrix} 1 & -5 \\ 3 & '3' \end{pmatrix}$			M1 for substituting their positive *k* to obtain **A** and **B**
		$\mathbf{C}=\mathbf{BA}='\begin{pmatrix} 1 & -5 \\ 3 & 3 \end{pmatrix}''\begin{pmatrix} 18 & -6 \\ -9 & 4 \end{pmatrix}'$			M1 for correct order of operations for **C** (allow if in terms of *k*, $\begin{pmatrix} 2k^2+15k & -4k-14 \\ 3k^2 & k^2+4k-27 \end{pmatrix}$)
			$\begin{pmatrix} 63 & -26 \\ 27 & -6 \end{pmatrix}$	3	A1
					Total 12 *marks*

11		$\left[P=\right]2\left(2x+3\right)+2\left(4x-8\right)\left[=12x-10\right]$			B1 Expression for *P* may be unsimpified
		$\tan\theta=\dfrac{h}{\frac{1}{2}\left(4x+2\right)}\left(\Rightarrow h=\dfrac{1}{2}\left(2x+1\right)\right)$			M1 for equation/expression for the height of the triangle or method to find *EG* or *FG* e.g. $\theta = \tan^{-1} 0{,}5$ [= awrt 26.6] and $EGF = 180 - 2 \times 26.6$ [= awrt 127] and $\dfrac{EG}{\sin'26.6'}=\dfrac{\left(4x+2\right)}{\sin'127'}\left[EG=\text{awrt } 0.56(4x+2)\right]$
		$T=\dfrac{1}{2}\left('\dfrac{1}{2}\left(2x+1\right)'\right)\left(4x+2\right)$ or $T=\dfrac{1}{2}(4x+2)\times'0.56(4x+2)'\sin'26.6'$			M1 fully correct method to find area of triangle *EFG* following from their height, *EG* or *FG*. If these are not correct they must be unambiguously labelled (may be seen on diagram)
		$12x-10\geqslant\dfrac{1}{4}\left(2x+1\right)\left(4x+2\right)$			M1 mark found for setting their $P \geqslant T$ where *P* must be linear in *x* and *T* must be quadratic in *x* condone = , >, < or $\leqslant$ rather than $\geqslant$
		$4x^2-20x+21\leqslant0$			M1 dep for rearranging to a 3-term quadratic in *x* condone = , >, < or $\leqslant$ rather than $\geqslant$
		$\left(2x-3\right)\left(2x-7\right)\leqslant0$ $\Rightarrow$ c.v. $\dfrac{3}{2},\dfrac{7}{2}$			M1 Correct method for solving their 3 term quadratic (need not be inequality). For factorising 2 terms correct when multiplied out. If the formula or completing the square used, allow one sign or numerical error. Must see working to award this unless their c.v, are 1.5 and 3.5.
		$'\dfrac{3}{2}'\leqslant x\leqslant'\dfrac{7}{2}'$			M1 dep on having a quadratic for $a \leqslant x \leqslant b$ with their critical values *a*, *b* where $b > a$ (choosing the inside region) Allow < sign rather than $\leqslant$ or other indication of the values inbetween eg '1.5' to '3.5'
		But $BC > 0$ therefore $4x-8>0$	$2<x\leqslant\dfrac{7}{2}$	8	A1 (oe) For the final answer given correctly award all marks. Must have correct inequalities.
					Total 8 *marks*