Pearson Edexcel

Mark Scheme (Results)

January 2023

Pearson Edexcel International GCSE
In Mathematics B (4MB1)
Paper 01

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

January 2023
Question Paper Log Number P72477
Publications Code 4MB1_01_2301_MS

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 there is a wrong answer indicated on the answer line 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, mark the method that leads to the answer on the answer line; where no answer is given on the answer line, award the lowest mark from the methods shown.

If there is no answer on the answer line then check the working for an obvious answer.

- **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	$6\times2^2-5$ **and** $6\times4^2-5$ **or** 6×2^2 **and** 6×4^2 **or** 19 **and** 91 **or** 24 **and** 96		2	M1 Implied by an answer of 72 and/or –72
	Correct answer scores full marks (*unless from obvious incorrect working*)	± 72		A1 Allow 72 or –72
				Total 2 marks

Question	Working	Answer	Mark	Notes	
2	$165 = 3\times5\times11$ **and** $60=2^2\times3\times5$ **or** Factors (165) 1, 3, 5, 11, 15, 33, 55, 165 **and** Factors(60) 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 **or** 5 | 60 | 165 3 | 12 | 33 4 | 11 **or** 60 2 | 30 5 | 6 2 | 3 **and** 165 5 | 33 3 | 11		2	M1	Both numbers expressed as a product of primes (Allow $4\times3\times5$) **or** factors given up to 15 for both numbers **or** a correct table or 2 correct trees
	Working required	15		A1	Dependent on M1 awarded
					SC answer of 15 only with none of the above working is B1
					Total 2 marks

Question	Working	Answer	Mark	Notes
3	$6\left(af+5f^2\right)$ or $f\left(6a+30f\right)$ or $2f\left(3a+15f\right)$ or $3f\left(2a+10f\right)$ or $2\left(3af+15f^2\right)$ or $3\left(2af+10f^2\right)$		2	M1 Allow $6f(a + nf)$ where n is an integer
		$6f(a + 5f)$		A1 $6f(5f + a)$
				Total 2 marks

Question	Working	Answer	Mark	Notes
4	$\frac{13}{3}\times\frac{2}{5}$ or $\frac{26}{6}\div\frac{15}{6}$ or $\frac{4+1/3}{2+1/2}=\frac{24+2}{12+3}$		2	M1 Or equivalent method for dividing 2 fractions
	$\frac{26}{15}$ and *Working required*	$1\frac{11}{15}$		A1 Dependent on M1 being awarded for working seen. Need to see 26/15 leading to correct answer
				Total 2 marks

Question	Working	Answer	Mark	Notes
5	$5x-3x\leqslant 15$		2	M1 For correctly collecting terms in x on one side and numerical terms on the other side. Allow equation or incorrect inequality sign. Allow for $x=7.5$ or just 7.5 or $x\geqslant 7.5$
	Correct answer scores full marks (unless from obvious incorrect working)	$x\leqslant 7.5$		A1 ISW Accept $7.5\geqslant x$ and $\frac{15}{2}$ instead of 7.5 allow if you see the correct answer in the working but incorrect on the answer line
				Total 2 marks

Question	Working	Answer	Mark	Notes
6	eg 23.1×10^{147} or 231×10^{146} or 2.31×10^{n} where $n\neq148$ or $a\times10^{148}$ where $1\leqslant a<10$		2	M1 For a correct answer not in standard form or for one part correct
	Correct answer scores full marks (unless from obvious incorrect working)	2.31×10^{148}		A1
				Total 2 marks

Question	Working	Answer	Mark	Notes
7	Sale price $=600+4\times180$ [=1320]		3	M1 Correct method to find total sale price. May be implied by 1320 or 600 + 720
	Presale price $=\dfrac{\text{"1320"}}{0.96}$ or $x-\dfrac{4}{100}x=\text{"1320"}$ oe			M1 For dividing by 0.96 Allow $\dfrac{n}{0.96}$ or $\dfrac{n}{96}\times100$ where n is positive
	Correct answer scores full marks (unless from obvious incorrect working)	1375		A1
				NB × by 1.04 gives an answer of 1372.8(0) and is M1M0A0 unless the method marks can be awarded in the working.
				Total 3 marks

Question	Working	Answer	Mark	Notes
8	$y=-4x\pm c$ where $c\neq5$ or $y=-4x$ or $y-a=-4(x-b)$ oe		3	M1 For a correct gradient in the final equation
	$-6=m\times2+C$ or $y--6=m(x-2)$ where m is their gradient			M1 Subst $x=2$ and $y=-6$ into an equation of the line with the gradient of the final equation Allow $y+4x=5+(-6-(-3))$
	Correct answer scores full marks (unless from obvious incorrect working)	$y=-4x+2$		A1 Do not ISW. Allow $y=2-4x$
				Total 3 marks

Question	Working	Answer	Mark	Notes
9		enlargement	3	B1 Must be as a single transformation Condone words that clearly mean enlargement eg enlarged / enlarge/ enlarging.
		SF − 0.5		B1
		Centre (1, 5)		B1 condone (1, 5) on its own
				SC B2 for rotation of 180 degrees about (1, 5) and enlargement with scale factor 0.5 All information required.
				Total 3 marks

Question	Working	Answer	Mark	Notes
10	$\left[2\sqrt{300}=\right] 2\sqrt{3\times100}$ **or** $2\sqrt{3\times10^2}$ or $2\sqrt{2^2\times3\times5^2}$ or $\sqrt{100\times12}$ **or** $\sqrt{10^2\times12}$ **or** $\sqrt{2^2\times5^2\times12}$ $\left[\sqrt{300}=\right] \sqrt{3\times100}$ or $\sqrt{3\times10^2}$ **or** $\sqrt{3\times2^2\times5^2}$ **or** $\sqrt{25\times12}$ or $\sqrt{5^2\times12}$ $\left[\sqrt{108}=\right]$ $\sqrt{3\times36}$ or $\sqrt{3\times6^2}$ or $\sqrt{9\times12}$ **or** $\sqrt{3^2\times12}$ **or** $\sqrt{3\times2^2\times3^2}$		3	M1 for one root/part expressed correctly Allow if split eg $\sqrt{3}\times\sqrt{100}$ or a correct decomposition consisting of at least 2 surds, one of which is a square number.
	$20\sqrt{3} - 6\sqrt{3}$ [= $14\sqrt{3}$] **or** $10\sqrt{12}-3\sqrt{12}\left[=7\sqrt{12}\right]$			M1 Dep on 1st M1 awarded. Allow for a correct answer of $14\sqrt{3}$ or $7\sqrt{12}$
	Working required	588		A1 Dep on 2nd M1 awarded. Condone $\sqrt{588}$ or $\left(14\sqrt{3}\right)^2$
				SC if no marks awarded award B1 for 588 condone $\sqrt{588}$
				Total 3 marks

Question	Working	Answer	Mark	Notes
11(a)		1	1	B1 allow $1 > 0$, or $0 < 1$ or $\frac{a}{a}$ or $a^0 = 1$ do **not** allow a^1 or $a^1 = 0$ or $1 < 0$ or $0 > 1$
(b)		$22w^7$	1	B1 allow $w^7 22$
(c)		$8y^{12}$	2	B2 B1 for a product with 1 part correct and 2 parts in total
				Total 4 marks

Question	Working	Answer	Mark	Notes
12	$\angle DAB = 75$ or $\angle BDE = 180 - 75 [= 105]$ or reflex $\angle DOB = 210$		3	M1 A correct first step – may be on diagram if not seen on diagram needs to be labelled Allow equivalent labelling eg $\angle BAD$ or $\angle A = 75$ and $\angle BCD$ or $\angle C = 105$ but do not accept $\angle B$ or $\angle D$ (accept if their $\angle BDA + \angle ADE$ = 105 on diagram)
	Correct answer scores both marks but see notes	105		A1 If this is not on the answer line it must be clearly labelled or clearly identified as $\angle BCD$ in the working
	$\angle DAB$ = 75 alternate segment theorem or tangent-chord theorem opposites angles of a cyclic quadrilateral sum to 180° **$\angle BDE$ = 180 – 75** angles on a straight line add to 180° alternate segment theorem **reflex $\angle DOB$ = 210** Angle between tangent and radius (diameter) is 90° Base angles in an isosceles triangle (are equal) Angles in a triangle add to 180° Angles around a point add up to 360° Angle at the centre is 2 × (double) angle at circumference **or** angle at circumference is ½ angle at centre			B1 All correct reasons given for their method which should lead to the correct answer if no numerical errors made. Need words underlined. They may use different methods of reasoning which may also include Angles in a quadrilateral add up to 360. Accept "4-sided shape" We will allow △ for 'triangle' and ∠ for angle and Σ for sum and shortened words eg Alt for Alternate, opp for opposite
				Total 3 marks

Question	Working	Answer	Mark	Notes
13	8.915, 8.905, 5.815, 5.825, 9.5, 8.5		3	B1 for one correct bound seen Allow equivalent eg 8.91 ± 0.005
	$a = \dfrac{8.905 - 5.825}{9.5}$			M1 $a = \dfrac{LB_v - UB_u}{UB_t}$ where $8.905 \leqslant LB_v < 8.91$, $5.82 < UB_u \leqslant 5.825$ and $9 < UB_t \leqslant 9.5$ Allow equivalent eg $a = \dfrac{8.91 - 0.005 - (5.82 + 0.005)}{9 + 0.5}$
	Working required	0.324		A1 allow $\dfrac{154}{475}$ awrt 0.324 from fully correct working - Allow use of 5.82499... and/or 9.499…
				Total 3 marks

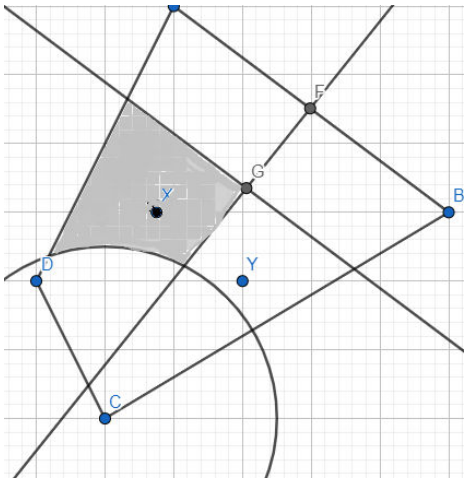
Question	Working	Answer	Mark	Notes
14	$180-\frac{360}{5}\left[=\frac{540}{5}=108\right]$ or exterior angle = 72°		4	M1 Correct method to find the interior angle or exterior angle of the pentagon. May be marked on the diagram. Allow if 108 or 72 seen
	$69-\left(90-\frac{180-108}{2}\right)\left[=69-\frac{108}{2}=15\right]$ or $[\angle GEF =]360-(108-90)-69-108[=165]$ or $(180-69)+72-18=165$ or $360-\left(69+\frac{108}{3}+90\right)$			M1 A correct expression to find the exterior or interior angle of the *n*-sided polygon eg $[\angle GEF =]360-(\text{"}180-90-(180-108)\text{"})-69-108[=165]$ There may be other correct methods.
	$n=\frac{360}{\text{"15"}}$ or $\frac{(n-2)\times 180}{n}=\text{"165"}$ oe			M1 dep on the previous M1. A correct method to find the value of *n*
	Correct answer scores full marks (*unless from obvious incorrect working*)	24		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
15	$\frac{4}{3}\pi r^3$ and $\frac{1}{3}\times\pi r^2\times 20$ oe		4	M1 For both volumes correct. Implied by $\frac{4}{3}\pi r^3 = 1.5 \times \frac{1}{3}\times\pi r^2\times 20$ or $1.5 \times \frac{4}{3}\pi r^3 = \frac{1}{3}\times\pi r^2\times 20$ Allow $\frac{22}{7}$ or 3.14[159…] for π
	$\frac{4}{3}\pi r^3 = 1.5\times\frac{1}{3}\times\pi r^2\times 20$ oe			M1 For forming a correct equation
	$4r = 1.5\times 20$ oe (this may involve π)			M1 dependent on 1st M1 and use of 1.5 on either side. For isolating the term in r correctly. eg $4\pi r = 1.5\times 20\pi$ may be implied by 7.5, condone $6r = 20$ $r = \frac{10}{3}$ or 3.33...
	Correct answer scores full marks (unless from obvious incorrect working)	7.5		A1 ISW if seen in working as $r = 7.5$ oe . Condone awrt 7.5 or 7.49
				Total 4 marks

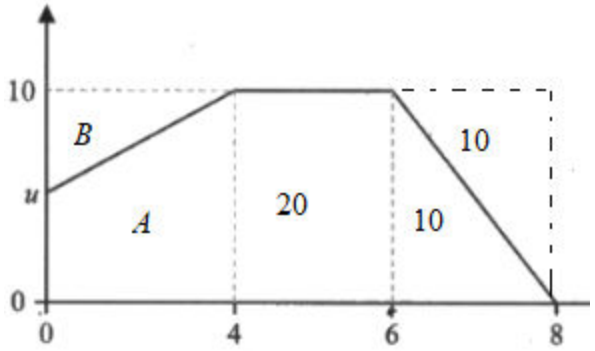
Question	Working		Answer	Mark	Notes	
16	Method 1	Method 2				
	$[P =]\frac{k}{\sqrt{W}}$	$P^2 = \frac{j}{W}$		4	M1 oe for $\frac{k}{\sqrt{W}}$ or $\frac{1}{h\sqrt{W}}$ or $P\sqrt{W} = k$ or $P^2 = \frac{j}{W}$ or $P^2 = \frac{1}{gW}$ or $WP^2 = j$ Condone use of another symbol rather than equals. Implied by a correct equation in a single letter	M2 for $1600\sqrt{1.96} = 800\sqrt{W}$ or $1600^2 \times 1.96 = 800^2 W$
	$1600 = \frac{k}{\sqrt{1.96}}[\Rightarrow k = 2240]$	$1600^2 = \frac{j}{1.96}[\Rightarrow j = 5017600]$			M1 Use given values to form a correct equation in k or j only (allow any letter) $h = \frac{1}{2240}$ $g = \frac{1}{5017600}[= 0.000000199...]$	
	$W = \left(\frac{"2240"}{800}\right)^2$	$W = \frac{"5017600"}{800^2}$			M1 dep on M1 A correct method to find W using their k or j If k is incorrect working must show the intention to square	
	Correct answer scores full marks (*unless from obvious incorrect working*)		7.84		A1 do not ISW Allow $\frac{196}{25}$	
					SC award B1for answer of 0.49[00…] using of $k\sqrt{W}$ or 2.77[185…] using $\frac{k}{W^2}$	
						Total 4 marks

Question	Working	Answer	Mark	Notes
17	$\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$		4	M1 Matrix for reflection in $y = -x$
	$\begin{pmatrix} 4 & -2 \\ 1 & 3 \end{pmatrix}\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$			M1 Allow $\begin{pmatrix} 4 & -2 \\ 1 & 3 \end{pmatrix}\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ where a, b, c and d are 0 or ± 1
	Correct answer scores full marks (*unless from obvious incorrect working*)	$\begin{pmatrix} 2 & -4 \\ -3 & -1 \end{pmatrix}$		A2 dep on previous 2nd method mark being awarded. All values correct (A1 for 2 terms correct)
				Total 4 marks

Question	Working	Answer	Mark	Notes
18	$\sqrt[3]{\left(\frac{1125}{576}\right)^2}\left[=\frac{25}{16}=1.5625\right]$ **or** 25 : 16 **or** $\sqrt[3]{\left(\frac{576}{1125}\right)^2}\left[=\frac{16}{25}=0.64\right]$ **or** 16 : 25		4	M2 For a correct SF or ratio M1 for $\sqrt[3]{\frac{1125}{576}}\left[=\frac{5}{4}\right]$ or $\left(\frac{1125}{576}\right)^2$ or $\sqrt[3]{\frac{576}{1125}}\left[=\frac{4}{5}\right]$ or $\left(\frac{576}{1125}\right)^2$ or $\sqrt[3]{1125}:\sqrt[3]{576}$ or 5 : 4 or 4 : 5 or $125^2 : 64^2$ or $64^2 : 125^2$ oe (useful number $\frac{10.4}{8.32}=\frac{5}{4}$)
	$\sqrt[3]{\left(\frac{1125}{576}\right)^2}\times$ SA of **B** + SA of **B** = 3198 **or** $\frac{25}{16}b+b=3198$ **oe or** $\sqrt[3]{\left(\frac{576}{1125}\right)^2}\times$ SA of **A** + SA of **A** = 3198 **or** $\frac{16}{25}a+a=3198$ **oe**			M1 A correct equation or ratio Allow $\frac{16}{25+16}\times 3198$ or $\frac{25}{25+16}\times 3198$ or SA of **A** =1950
	Correct answer scores full marks (unless from obvious incorrect working)	1248		A1 Allow awrt 1248 or 1249 from correct working
				Total 4 marks

Question	Working	Answer	Mark	Notes	
19(a)		Correct arc	1	B1	for an arc of a circle inside the quadrilateral that is 5 cm from *C* Allow a circle. Must cross *AD* and *BC*
(b)		Correct bisector	2	B2	correct perpendicular bisector of *XY*, with 2 pairs of arcs the arcs in each pair must have the same radius and bisector drawn. B1 for 2 sets of arcs with no line drawn or for a bisector drawn without arcs. Must cross *AB* and *CD*
(c)		Line drawn parallel to *AB* at a distance of 3 cm	1	B1	Line drawn inside the quadrilateral that is 3 cm from *AB* Must cross *AD* and *BC*
(d)		Correct region shaded or labelled	1	B1ft	dep on the perpendicular bisector drawn within the permitted region shown; there must be an attempt of a line drawn parallel to *AB*; there must be an arc drawn from *C* The area indicated must be enclosed by the 3 lines and *AD*
					Total 5 marks

Question	Working	Answer	Mark	Notes
20(a)		0	1	B1
(b)		1	1	B1
(c)	$1.7\times 20[=34]$ **or** $[0\times 6+]1\times 4+2\times 5+3\times 3+4\times 1[=27]$		3	M1 Correct method to find the total of the 19 students (allow 1 error) may be seen on the table or the total of the 20 students or as part of another calculation. Allow for 27 or 34 seen
	$1.7\times 20-([0\times 6+]1\times 4+2\times 5+3\times 3+4\times 1)[=27]$oe			M1 Correct method to find the number of times Bhaskor visits the cinema eg $34-"27"$ or $\frac{"27"+x}{20}=1.7$ Allow their "27"
	Correct answer scores full marks (*unless from obvious incorrect working* see notes)	7		A1 **NB** watch for incorrect method of 27 – 20
				Total 5 marks

Question	Working	Answer	Mark	Notes
21(a)	$\frac{10}{8-6}$		2	M1
	Correct answer scores full marks	5		A1 condone −5
(b)			3	
	[Area A =] $\frac{4}{2}(10+u)$ or $4u+\frac{1}{2}\times 4\times(10-u)$ oe [Area B =] $\frac{4}{2}(10-u)$ oe			M1 finding Area A or Area B in terms of u. Implied by a correct equation
	$\frac{4}{2}(10+u)+20+10=65$ or $4u+\frac{1}{2}\times 4\times(10-u)+20+10=65$ $\frac{4}{2}(10-u)=\frac{10}{2}(8+6)-65$ or $\frac{4}{2}(10-u)=8\times 10-10-65$ oe			M1 for forming a correct equation
	Correct answer scores full marks (*unless from obvious incorrect working*)	7.5		A1 oe
				Total 5 marks

Question	Working	Answer	Mark	Notes
22(a)	$\frac{12}{30}\times 100$		2	M1 for $\frac{n}{30}\times 100$ where $2 < n < 17$
	Correct answer scores full marks (*unless from obvious incorrect working*)	40		A1
(b)	$(4\times 1)+(9\times 4)+(5\times 7)+(3\times 10)+(7\times 13)+(2\times 16)$ $[4+36+35+30+91+32=228]$		4	M2 for correct calculation (need not be evaluated) If no working shown then figures must be correct. Give bod if values in a list and a total given. (M1 for *xf* calculated and added for at least 3 class intervals where *x* is a number in the range (incl end points) **or** correct mid-points used for at least 3 products but not added)
	Mean = $\frac{228}{30}$			M1 dep on at least M1 previously scored. For dividing their sum by 30
	Correct answer scores full marks (*unless from obvious incorrect working*)	7.6		A1 oe ISW allow if seen in working
				Total 6 marks

Question	Working	Answer	Mark	Notes
23	$x^2-5x+6=(x-3)(x-2)$		5	M1 for factorising x^2-5x+6. Allow a factorised expression that expands to give 2 of 3 terms correct
	$x^2-4=(x-2)(x+2)$			M1 for factorising x^2-4 correctly
	$(x-3)^2\times\left(\dfrac{2}{(x-3)(x-2)}\right)$			M1 for dealing with the division correctly. Turning upside down and multiplying – need not be factorised. Must be done before the subtraction
	eg $\dfrac{2(x-3)-1}{(x-2)}$ or $\dfrac{(2x-7)(x+2)}{(x+2)(x-2)}$ or $\dfrac{2x^2-7x+4x-14}{(x+2)(x-2)}$ or $\dfrac{2x-7}{x-2}$ or $\dfrac{2(x-3)(x-2)-(x-2)}{(x-2)(x-2)}$			M1 dependent on 3rd M for a single fraction with at most one incorrect term (when expanded). eg if they had +5 rather than –7 that counts as one error. ISW Allow $\dfrac{2(x-3)^2(x^2-4)-(x+2)(x^2-5x+6)}{(x^2-5x+6)(x^2-4)}$ or $\dfrac{3x^2+2x-x^3-6}{x^4+2x^2-5x^3+20x-24}$ oe if fully correct
	Working required	$\dfrac{2x-7}{x-2}$		dependent on all 4 M marks awarded. A1 Allow $2-\dfrac{3}{x-2}$
				Total 5 marks

Question	Working	Answer	Mark	Notes
24(a)	$18\times(-1)^3-9\times(-1)^2-17\times(-1)+10$		2	M1 correct substitution of $x = \pm 1$ into equation. Must be same value substituted. Allow $18\times(\pm1)-9\times1-17\times(\pm1)+10$ or $-18-9+17+10$ or $18-9-17+10$
	Working required	$=0$		A1 dep on M1 must have no errors and $=0$
(b)	$18x^2...$		4	M1 for a start to find the quadratic factor. This may be seen in part (a)
	$18x^2-27x+10$			M1 for a fully correct 3 term quadratic. This may be seen in part (a)
	$(3x-2)(6x-5)$			M1 correct method to factorise their 3TQ – Must multiply out to give 2 of their terms.
	Working required	$(x+1)(3x-2)(6x-5)$		A1 Dep on M2 (2 of the previous 3 method marks awarded) Only accept what is seen (any order). Don't accept a list with commas. Condone = 0 but do not ISW if gone on to solve.
				Total 6 marks

Question	Working	Answer	Mark	Notes

Question	Working	Answer	Mark	Notes
25(a)	Differentiating.		2	M1 2 non-zero terms correct
	Correct answer scores full marks (unless from obvious incorrect working)	$-3t^2+8t+3$		A1 accept $3t^0$ for 3
(b)	$-3t^2+8t+3=0$ or $3t^2-8t-3=0$ oe		4	M1 Equating their part (a) to 0 or solving their part (a) = 0. Allow for correct equation
	$(-3t-1)(t-3)=0$ or $(3t+1)(t-3)=0$ or $(3t+1)(-t+3)=0$ or $(-3t-1)(-t+3)=0$ oe			M1 correct method to solve their 3TQ – Must multiply out to give 2 of their terms. Allow use of correct formula. Allow 1 sign error for both methods. Implied by $t = 3$ or $t = -1/3$ If their 3TQ is incorrect we must see working.
	$-("3")^3+4("3")^2+3\times"3"+1$			M1 Correctly substituting their positive value of t into the equation given for x. Condone $(-3)^3$ Ignore substitution of negative values for t If t is incorrect we must see working.
	Correct answer scores full marks (unless from obvious incorrect working)	19		A1 Do not allow if more than one value is given.
				Total 6 marks

26(a)	$\left[AD^2 =\right]\left(5\sqrt{15}\right)^2+\left(5\sqrt{3}\right)^2$ [= 450]		3	M1 A correct method to find AD^2 or $AD=15\sqrt{2}$ [= 21.2132…] (need not be labelled). May be seen on diagram.
	$\left[AB^2 =\right]\left(10\sqrt{3}\right)^2+\left("15\sqrt{2}"\right)^2-2\times10\sqrt{3}\times"15\sqrt{2}"\times\cos60$			M1 ft their *AD*. A correct method to find AB^2 or *AB* eg $300+450-2\times10\sqrt{3}\times15\sqrt{2}\times\cos60$
	Correct answer scores full marks (*unless from obvious incorrect working*)	19.6		A1 awrt 19.6 (19.559… so condone 19.5 (truncation))
(b)	$\left[BC^2 =\right]\left(10\sqrt{3}\right)^2-\left(5\sqrt{3}\right)^2$ [= 225]		5	M1 A correct method to find BC^2 or *BC* = 15 May award if *BC* found in (a) or on diagram.
	eg $"19.5595..."^2=\left(5\sqrt{15}\right)^2+"15"^2-2\times5\sqrt{15}\times"15"\cos\angle ACB$			M1 using the cosine rule to enable an angle to be found. Implied by the 3rd M1. Allow $s=\frac{5\sqrt{15}+"19.559"+"15"}{2}\left[=26.962...\right]$
	$\cos\angle ACB=\frac{\left(5\sqrt{15}\right)^2+"15"^2-"19.5595..."^2}{2\times5\sqrt{15}\times"15"}\left[=0.37425...\right]$ $\cos\angle CBA=\frac{"19.559..."^2+"15"^2-5\sqrt{15}^2}{2\times"19.559..."\times"15"}\left[=0.39635...\right]$ $\cos\angle CAB=\frac{\left(5\sqrt{15}\right)^2+"19.559.."."^2-"15"^2}{2\times5\sqrt{15}\times"19.559..."}\left[=0.703035...\right]$			M1 A correct method to find one of the angles in triangle *ABC* allow cos (any angle) =… (it does not need to be right one) $\angle ACB=68.0...\ \angle CBA=66.6...\ \angle CAB=45.3...$ or $"26.962...\times"\left("26.962..."-5\sqrt{15}\right)\times\left("26.962..."-"19.559"\right)\times\left("26.962..."-"15"\right)$
	using $\angle ACB$ Area $=\frac{1}{2}\times5\sqrt{15}\times"15"\sin"68.0216..."$ using $\angle CBA$ Area $=\frac{1}{2}\times"19.559..."\times"15"\times\sin"66.6494..."$ using $\angle CAB$ Area $=\frac{1}{2}\times5\sqrt{15}\times"19.559..."\times\sin"45.3289..."$			M1 dep on 3rd Method mark being awarded. A correct method with sides compatible to the angle found for 3rd M1 $\sqrt{"26.962..."\times\left("26.962..."-5\sqrt{15}\right)\times\left("26.962..."-"19.559"\right)\times\left("26.962..."-"15"\right)}$
	Correct answer scores full marks (*unless from obvious incorrect working*)	135		A1 134.68… so awrt 135
				Total 8 marks

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom