GCSE Mathematics (Edexcel 8462)

Higher Tier

Mark scheme

Introduction

The information provided for each question is intended to be a guide to the type of answers students may produce, but can be neither exhaustive nor prescriptive. Award marks according to your professional judgement for all appropriate responses.

Disclaimer

- These mark schemes and exemplar answer content are entirely the work of the question author and have not been produced by, reviewed by or endorsed by Edexcel.
- Where marks are suggested and levels mapped to particular styles or features of answers, these are intended for guidance only and cannot reflect the full examination marking process, which involves moderation and alignment of level boundaries across a full, national student cohort that cannot be determined from a standalone product such as this set of Practice Papers.
- Therefore, mark allocation, mark totals, suggested levels and overall assessments of performance as found in these Practice Papers and Mark Schemes represent only a limited guide to possible outcomes, and are not a reliable indicator of actual performance.

Information for teachers

1. General

The mark scheme for each question gives:

- the marks available for each part of the question
- the total marks available for the question
- the correct answer or, if multiple correct answers are possible, a typical correct answer with variations
- extra information to help with making decisions about how many marks to award.

The 'extra information' is aligned to the appropriate answer and is only intended for consideration with that particular part of the answer.

2. Marks and working

All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively.

Questions where working is not required: In general, the correct answer should be given full marks.

Questions that specifically require working: In general, students who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3. Crossed out work

This should be marked unless it has been replaced with an alternative response.

4. Choice of method

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line then mark both methods **as far as they are identical** and award these marks.

5. Incorrect method

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

6. Follow through marks

Follow through marks that involve a single stage calculation can be awarded without working.

Follow through marks that involve more than one stage of calculation can only be awarded on sight of the relevant working.

7. 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 or its context.

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

8. Probability

Probability answers should be given as a fraction, percentage or decimal. If a decimal equivalent to a probability is given, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9. Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10. Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5–4.2) then this is inclusive of the end points (e.g. 3.5, 4.2) and all numbers within the range.

	Paper 1				
QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE		
1		29.904	1 for correct method (allow one error).		
			1 for digits 29904.		
			1 for correct placement of decimal point.		
2		$p^2 + p - 6$	1 for at least 3 terms out of a maximum of 4 correct from expansion.		
			1 for correct answer.		
3a		90	1 for start to calculation, e.g. $5 \times 126 (= 630)$ 1 for '630' $\div 7$		
			1 for correct answer		
Зb		Correct explanation	1 for e.g. train B may travel a different distance and therefore its average speed could be different.		
4		Correct sketch, e.g. 2 cm 4 cm 4 cm 4 cm 5 cm	 for interpreting diagram e.g. draw a solid shape with at least two correct dimensions. drawing correct prism with all necessary dimensions. 		

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
5		118	1 for start to method: e.g. angles <i>AFE</i> and <i>BED</i> are corresponding angles so are equal.
			1 for angle $EDB = 180^{\circ} - (58^{\circ} + 60^{\circ}) = 62^{\circ}$
			1 for $x = 180^{\circ} - 62^{\circ}$
			= 118°
6		75	1 for start to process,
			e.g. $\frac{12}{40} \times 250$
			1 for correct answer.
			1 for assumption that the first 40 customers are representative of the rest of the customers. If different, fewer or more cappuccinos could be sold.
7a		12	1 for process to start to solve problem e.g. $\frac{2}{5} \times 30$ or divide any number in the ratio 2 : 3 1 for answer.
7b		No, smallest possible number is 50 as 30% of 25 is not a whole number.	1 for showing that e.g. 30% of 25 = 7.5 students. 1 for explanation.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
8		3.5×10^{-2}	1 for evidence of a correct method.
			1 for correct answer.
9a		3	1 for correct answer.
9b	First take square root of $\frac{16}{25} = \frac{4}{5}$	$\frac{125}{64}$	1 for correct first step.
	Then cube to give $\frac{64}{125}$ and invert	04	1 for correct answer.
10a	Need to estimate $\frac{1}{(1.602 \times 10^{-19})}$	5×10^{18}	1 for process to estimate or divide.
	(2×10^{-19})		1 for complete process.
			1 for answer.
10b		Underestimate, e.g. because number was rounded up but in denominator of fraction.	1 for answer and explanation.
11	Opposite angles in cyclic quadrilateral add up to 180° 2x + 10 + 3x - 15 = 180 5x = 185 so $x = 37$	x = 37 y = 39	 for process to start solving problem, e.g. forming an appropriate equation. for complete process to
	5y - 3x + 3x - 15 = 180		isolate in terms of <i>x</i>
	5y = 195 so $y = 39$		1 for complete process to find second variable.
			1 for $x = 37$
			1 for <i>y</i> = 39
12		30	1 for correct method, e.g. 600×0.05
			1 for correct answer.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
13	Area = $\frac{1}{2} \times AB \times BE = \frac{1}{2} \times 7.5 \times 9$	33.75	1 for start of process to find scale factor, e.g. $\frac{AB}{5} = \frac{9}{6}$ 1 for complete process to find area. 1 for correct answer.
14		No, with reason	1 for starting to formulate reason, e.g. 0.8×0.8 1 for no with full explanation, e.g. $0.8 \times 0.8 \times \pounds 250 = \pounds 160$
15a	Median = 54 Lower quartile = 50 Upper quartile = 58	Correct box plot	 for starting to interpret information, e.g. working out median, upper quartile and lower quartile. for starting to draw box plot. for correct box plot.
15b	For farmer A, interquartile range = 8, range = 13	Farmer B with reason, e.g. lower interquartile range and lower range	 for interpreting box plot to find interquartile range and range. for comparison.
16		$b = \frac{16d - 5}{4d - 7}$	 for removing fraction and expanding brackets. for isolating term in <i>b</i>. for correct answer.
17		9(3x + 1)(3x - 1)	1 for $9(9x^2 - 1)$ 1 for correct answer.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
18	$x^{2} + x - 20 > 0$ $(x + 5)(x - 4) > 0$	x > 4, x < -5	1 for rearranging and factorising.
			1 for finding critical values of 4 and -5
			1 for correct answer.
19		500	1 for length scale factor, e.g. $\sqrt{\frac{25}{36}}$ 1 for volume scale factor $\left[\sqrt{\frac{25}{36}}\right]^3 \times 864$
			1 for correct answer.
20a	$\begin{vmatrix} \frac{1}{2} \times 30 \times 20 + (t - 20) \times 30 + \frac{1}{2} \times 30 \\ \times (150 - t) = 3900 \end{vmatrix}$	130	1 for equating area under graph to 3900 m
	$\frac{1}{2} \times 20 + (t - 20) + \frac{1}{2} \times (150 - t) = \frac{3900}{130}$		1 for setting up an equation to solve for <i>t</i>
	$10 + t - 20 + 75 - \frac{1}{2}t = 130$ $t = 2 \times 65$		1 for correct answer.
20b		Description	1 for starting to interpret graph e.g. describe or give acceleration for one stage of the journey or state that acceleration is constant in all 3 parts.
			1 for describing acceleration for all stages of the journey (positive, constant speed/ zero, negative) or giving acceleration for all 3 stages (1.5 m/s ² , 0 m/s ² , -1.5 m/s ²).

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
21		Bars drawn correctly	1 for each bar drawn correctly.
22		10	1 for starting to solve, e.g. use of x and 8x or x / 8x and 7x / 8x 1 for forming an equation, e.g. $\frac{x}{8x} \times \frac{x-1}{8x-1} = \frac{9}{632}$ 1 for eliminating fractions and reducing equation to linear form, e.g. 632x - 632 = 576x - 72 1 for correct answer.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
23a		Enlargement drawn correctly	1 for shape in correct orientation.
		$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1 for correct position.
23b		Enlargement scale factor –2, centre (0, 0)	1 for correct answer.
24		Given result	1 for correct first step towards simplifying expression, e.g. $\frac{\sqrt{3}}{2\sqrt{3}-1}$ 1 for correct step to rationalise denominator (multiply top and bottom by 2 $\sqrt{3}$ + 1). 1 for conclusion to given result.
25		3x + y = 11	 1 for process to start to solve the problem, e.g. draw a diagram, find gradient of <i>AB</i> (-0.5) 1 for using gradient to find gradient of <i>BC</i> (2) 1 for finding <i>x</i> coordinate of C (6) 1 for process of finding equation of <i>AC</i>. 1 for correct answer.
TOTAL			80

Paper 2				
QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE	
1a	8x - 28 + 10 + 30x	38x - 18	1 for correct expansion of brackets.	
			1 for correct answer.	
1b	$7a^3b^{-1} \times 2ab^2$	$14a^4b$	1 for simplification of square root expansion.	
			1 for correct answer.	
2		translation	1 for translation.	
		$\begin{bmatrix} -7\\ -6 \end{bmatrix}$	1 for correct vector.	
3a		The square does not apply to the <i>g</i> so she has square-rooted incorrectly.	1 for a similar explanation.	
3b		$g = \frac{2(s - ut)}{s^2}$	1 for correct working.	
			1 for correct answer.	
4a		A B ξ	1 for correct numbers in intersect.	
		$\left \begin{array}{c} 2 \\ 5 \\ 11 \\ 13 \\ 7 \end{array} \right 21 \\ 21 \\ 21 \\ 21 \\ 21 \\ 21 \\ 3 \\ 7 \\ 21 \\ 3 \\ 7 \\ 21 \\ 3 \\ 7 \\ 7$	1 for correct numbers in A and B outside intersect.	
		17 19 4 6 8 9 14 16 15 20	1 for correct numbers outside A and B.	
4b		$\frac{10}{21}$	1 for correct answer.	
4c		$\left \frac{11}{21} \right $	1 for correct answer.	

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
5	$2x - 1 = x^2 - 4x + 3$		1 for equating y-values.
	$x^2 - 6x + 4 = 0$		1 for equating to zero.
	$x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(4)}}{2(1)}$		
	$=\frac{6\pm\sqrt{36-16}}{2}$		1 for correct substitution into formula.
	$= \frac{6 \pm \sqrt{20}}{2} = \frac{6 \pm \sqrt{20}}{2} \text{ or } \frac{6 - \sqrt{20}}{2}$		1 for separation.
	= 5.24 or 0.76 (2 d.p.)		
	y = 2(5.24) - 1 = 9.47 (2 d.p.)	Coordinates are (5.24, 9.47)	1 for correct coordinates.
	y = 2(0.76) - 1 = 0.53 (2 d.p.)	and (0.76, 0.53)	
6a		f(5) = 8	1 for correct answer.
6b	$y = \frac{(x+1)}{2}$	$g^{-1}(x) = 2x - 1$	1 for correct method.
	x = 2y - 1		Could also use a flowchart.
			1 for correct answer.
6c	$gf(x) = \frac{(2(x-1)+1)}{2}$	$gf(x) = \frac{2x-1}{2}$	1 for correct substitution of $f(x)$ into $g(x)$
			1 for correct answer.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
7a	RGW, RWG, GWR, GRW, WGR, WRG $6 \times \frac{18}{700} = \frac{3}{10}$	$\frac{3}{20}$	1 for process to start to solve problem by listing combinations.
	20 20		1 for stating or working out each combination has same probability.
			1 for correct answer.
7b	$\frac{7}{10} \times \frac{6}{9} \times \frac{5}{8}$	$\frac{7}{24}$ (or 0.29 as a decimal to 2 d.p.)	1 for correct working.
			1 for correct answer.
7c	P(All red) = $\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8} = \frac{1}{6}$ P(All green) = $\frac{3}{10} \times \frac{2}{9} \times \frac{1}{8}$	$\frac{7}{40}$	1 for each correct calculation of 1 colour probability.
	$=\frac{1}{120}$ P(Same colour) $=\frac{1}{6} + \frac{1}{120}$		1 for correct answer.
8a		5 cm	1 for correct answer.
8b		$\frac{5}{13}$	1 for correct answer.
8c		$\frac{12}{13}$	1 for correct answer.
8d		$\frac{5}{12}$	1 for correct answer.
8e	$\left(\frac{5}{12}\right)^2 + \left(\frac{12}{12}\right)^2 = \frac{169}{160}$		1 for correct value.
	13 13 169		1 for correct proof.
9		<i>y</i>	1 for correct shape.
		$y = \sin x - 1$	1 for correct intersection with both axes.
		0 90 180 270 360 x -2 -2	1 for correct maximum and minimum points.

QUESTION	WORKING	ANS	WER	MARKS AND GUIDANCE
10		Age (years)	Frequency	1 for each correct line (i.e. max 3 marks).
		$5 < n \le 5.5$	9	
		6 < <i>n</i> ≤ 7	7	
		9 < <i>n</i> ≤ 11	2	
11		A goes up by 2^2 (i.e. 4)		1 for statement or similar statement.
12a		0.079		1 for correct answer.
12b		2.92		1 for correct answer.
13	$A = 175\ 000 \times (1 + \frac{7}{100})^6$ $= 262\ 627.81$	£263 000 (nearest pound)		1 for correct formula with numbers inserted or evidence of some working.
				1 for unrounded answer.
				1 for correct answer with unit.
14a	$\frac{PQ}{ST} = 1.4$			1 for finding two (or more) ratios.
	$\frac{QR}{TU} = 1.4$ $\frac{RP}{US} = 1.4$			1 for explaining ratios/ scale factors are the same so similar.
14b	Area = $\frac{15}{1.4^2}$	7.65 cm² (2 d.p.)		1 for process of finding area.
				1 for correct area.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
15a	Gradient of OP	$\frac{5}{12}$	1 for use of coordinates.
	$=\frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 0}{12 - 0}$		1 for correct answer.
15b		$-\frac{12}{5}$	1 for correct answer.
15c	$y-5 = -\frac{12}{5}(x-12)$	5y = -12x + 169	1 for use of formula.
	5y - 25 = -12x + 144	(or any rearranged form)	1 for substitution of coordinates. 1 for correct answer.
16a	Angle $ABC = 90^{\circ}$ angle	55°	1 for correct reason out
	in a semicircle		of two.
	Angle <i>BCA</i> = 180 – (90 + 35)		1 for correct answer.
16b	$ADC = 90^{\circ}$ angle in a	55°	1 for <i>ADC</i> with reason.
	semicircle/opposite angles of a cyclic		1 for <i>ODC</i> with reason.
	quadrilateral add up to 180°		1 for correct answer.
	Angle $ODC = 35^{\circ}$ base		
	angle of isosceles		
	OD are both radii		
	Angle <i>ADO</i> = 90 – 35		
17	Upper bound for $a = 7.85$ cm	Upper bound for $c = 9.39$ cm	1 for each correct upper bound.
	Upper bound for $b = 5.15$ cm		1 for correct use of Pythagoras.
	$c^2 = 5.15^2 + 7.85^2$		1 for correct answer.
	<i>c</i> = 9.388 556 cm		

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
18a	Angle PQR = 180 - (50 + 81) = 49° Using the sine rule to find PR $\frac{PR}{\sin 49} = \frac{30}{\sin 81}$ PR = 22.92 cm	23 cm (2 s.f.)	 for finding <i>PQR</i>. for the use of the sine rule and correct substitution of values. for correct answer.
18b	Finding the length of QR using the sine rule $\frac{QR}{\sin 50} = \frac{30}{\sin 81}$ QR = 23.27 cm $RM = \frac{1}{2} \times 23.27 = 11.63 \text{ cm}$ Using the cosine rule in triangle <i>PMR</i> $(PM)^2 = (22.92)^2 + (11.63)^2 - 2 \times 22.92 \times 11.63 \times \cos 81$	<i>PM</i> = 24 cm (2 s.f.)	 correct use of sine rule to find <i>QR</i>. for correct length of <i>RM</i>. for the use of cosine rule even if numbers are slightly wrong. for correct answer.
19	Volume of sphere = $\frac{4}{3}\pi r^3$ Volume of cone = $\frac{1}{3}\pi r^2 h$ $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$ h = 4r		 for using two correct volume formulae. for equating volumes. for attempt at rearrangement. for correct answer.
TOTAL			80

Paper 3				
QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE	
1	$120\% = \pounds 480$		1 for evidence of correct method.	
	$1\% = \frac{\pm 480}{120}$ $100\% = \frac{\pm 480}{120} \times 100$	£400.00	1 for correct answer.	
2	$(2 \times 0.3)^2$	0.4	1 for numbers in the calculation to one significant figure.	
			1 for correct answer.	
За		<i>x</i> = 10	1 for correct answer.	
3b		<i>x</i> = 8	1 for correct answer.	
3с		$x = \frac{7}{4}$ or 3	1 for correct answer.	
4	$36 = 2 \times 2 \times 3 \times 3$ $40 = 2 \times 2 \times 2 \times 5$ $LCM = 2 \times 2 \times 2 \times 3 \times 3 \times 5$	360	 listing the prime factors of each number. marks for no evidence of working out. for correct answer. 	
5a	Diagonal of base = $\sqrt{2900}$	54.8 cm	1 for finding diagonal of base. 1 for correct answer.	
5b	$\tan^{-1} \frac{10}{54.8}$	10.3°	1 for the use of trigonometry. 1 for correct answer.	
6	$x = \frac{7 \pm \sqrt{(-7)^2 - 4(3)(-1)}}{2(3)}$ = $\frac{7 \pm \sqrt{61}}{6}$ = $\frac{7 \pm \sqrt{61}}{6}$ or $\frac{7 - \sqrt{61}}{6}$	2.47 or –0.14 (2 d.p.)	 for correct substitution into formula. for simplification of terms. for separation of answers. for two correct answers. 	
7	$y = 3(x^{2} - 2x + 3)$ = 3 [(x - 1) ² - 1 + 3] = 3 [(x - 1) ² + 2]	(1, –2)	 for taking 3 out as a factor. for attempt at completing the square. for correct coordinates. 	

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
8a	angle $BCD = 90^{\circ}$ (angle in a semi-circle)	49°	1 for angle + reason.
	angle ACB = angle ADB (angles bounded by the same arc/chord are equal)		1 for angle + reason. 1 for correct answer.
	a = 90 - 41		
8b	angle $GFB = a$ (alternate angles are equal)		1 for correct answer + reason.
	angle $EFC = b$ (alternate angles are equal)		1 for reason.
	a + b + c = 180 (angles on a straight line add up to 180°)		1 for reason.
8c	(Alternate segment theorem)	$c = 28^{\circ}$	1 for angle + reason.
	(Alternate segment theorem)	$d = 83^{\circ}$	1 for angle + reason (also give the mark for alternative method).
9	Let larger number = x and smaller number = y	15 and –1	1 for choice of letters to represent the numbers.
	x + y = 14		1 for forming two
	x - y = 16		equations in the unknowns.
	e.g. adding gives $2x = 30$ etc.		1 for dealing with equations simultaneously.
			1 for both correct answers.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
10	y = f(x) to $y = -f(x) + 1represents a translation of 1$		1 for working out the correct translation.
	unit to the left and a reflection in the <i>x</i> -axis.		1 for the reflection in the <i>x</i> -axis.
	Points (1, 0) will become (0, 0), (5, 0) will become (4, 0) and (3, 4) will become $(2, -4)$		(Note these can be in either order.)
	y		1 for working out at least two coordinates correctly.
			1 for the correct shape curve.
	(2, -4)		1 for all three coordinates correctly marked on the graph.
11a	$\begin{bmatrix} -3 \\ 4 \end{bmatrix} - \begin{bmatrix} 0 \\ -2 \end{bmatrix}$	$\begin{bmatrix} -3\\6 \end{bmatrix}$	1 for correct answer.
11b	$\begin{bmatrix} -12 \\ 16 \end{bmatrix} + \begin{bmatrix} 12 \\ 21 \end{bmatrix}$	$\begin{bmatrix} 0\\ 37 \end{bmatrix}$	1 for multiplication of vectors by scalars.
			1 for correct addition.
12	$(2n + 1)^{2} - (2n - 1)^{2}$ = 4n ² + 4n + 1 - 4n ² + 4n - 1		1 for correct expansion of brackets.
	= 8n 8n has 8 as a factor		1 for correct simplification of expression.
			1 for statement that expression has 8 as a factor.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
13	Number of girls = x Mean mark for whole class	18	1 for creation of equation.
	$\frac{12 \times 55 + 60x}{x + 12} = 58$		1 for attempt at simplification.
	660 + 60x = 58x + 696		1 for solving equation.
14a	$A = \frac{\theta}{260}\pi r^2$	140 m ²	1 for correct answer.
	$=\frac{40}{360}\pi \times 20^2$		1 for use of correct formula.
14b	volume = area × depth	7 m ³	1 for correct answer.
			1 for use of correct formula.
			1 for correct conversion to obtain volume in m ³
14c	mass = volume × density	8 tonnes	1 for use of correct formula.
			1 for correct conversions of units.
			1 for correct answer.
15	$\frac{1}{2x^2-x^2-2} \times \frac{4x^2-9}{1}$	$\frac{2x+3}{x+1}$	1 for inversion of fraction.
	$2x^2 - x - 5$ 1 1 $(2x - 2)(2x + 2)$	x + 1	1 for factorisation.
	$= \frac{1}{(2x-3)(x+1)} \times (2x-3)(2x+3)$		1 for cancelling fraction.
16		<u>5</u> 18	1 for listing suitable multiples of <i>x</i>
			1 for elimination of recurring part of number.
			1 for cancellation of fraction to give correct answer.

QUESTION	WORKING	ANSWER	MARKS AND GUIDANCE
17a		b – a	1 for correct answer.
17b	$\overrightarrow{QT} = \frac{1}{4}\overrightarrow{QR} = \frac{1}{4}(\mathbf{b} - \mathbf{a})$ $\overrightarrow{QS} = \frac{1}{4}\overrightarrow{QP} = -\frac{1}{4}\mathbf{a}$		1 for finding one of the vectors needed to find \vec{ST} .
	$\vec{ST} = \vec{SQ} + \vec{QT}$ $= \frac{1}{2}\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$		1 for finding another of the vectors needed to \vec{r}
	$= \frac{1}{4}\mathbf{b}$ Now $\overrightarrow{PR} = \mathbf{b}$ So \overrightarrow{ST} and \overrightarrow{PR} have the		find <i>ST</i> . 1 for forming a vector equation for \overrightarrow{ST} or the reverse vector \overrightarrow{TS} .
	same vector part b and are therefore parallel.		1 for clear statement using vectors then the lines are parallel.
18	B 30 km	62 km (2s.f.)	1 for an attempt at a diagram.
	N 75° 25° A		1 for working out angle <i>BAP</i> .
	60 km 335°		1 for correct values into cosine rule.
			1 for answer.
	Angle <i>BAP</i> = $(180 - (75 + 25)) = 80^{\circ}$		
	$BP^{2} = 30^{2} + 60^{2} - 2 \times 60$ × 30 cos 80		
19	$f(-3) = (-3)^3 - 2(-3) + 6$		1 for <i>f</i> (-3)
	= -15		1 for <i>f</i> (–2)
	$f(-2) = (-2)^3 - 2(-2) + 6 = 2$		1 for statement due to change of sign there must be a solution between these two values.

QUESTION	WORKING		ANSWER	MARKS AND GUIDANCE
20	Equation	Graph		1 for each correct letter placed in the table.
	$y = x^2 + 2$	Н		(8 marks total)
	$y = \frac{1}{x}$	С		
	$y = 2\cos x$	D		
	$y = -x^2$	А		
	y = -3x + 4	Е		
	y = 2x + 2	F		
	y = (x - 1)(x - 3)	В		
	$y = 4^x$	G		
TOTAL				80

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