Q1.

Diagram **NOT** accurately drawn

AB is parallel to CD.
Angle BEF = 127°.

(i) Write down the value of *y*.

y = ...

(ii) Give a reason for your answer.

....

(Total 2 marks)

Q2.
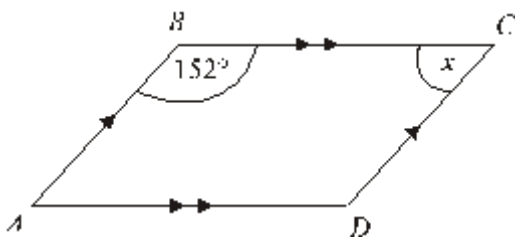
Diagram **NOT** accurately drawn

$ABCD$ is a parallelogram.

Work out the size of the angle marked x.

x = ... °

(Total 2 marks)

Q3.
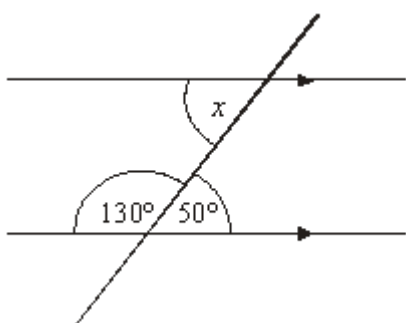
Diagram **NOT** accurately drawn

(a)   Write down the size of the angle marked x.

...........................°

(1)

(b)   Give a reason for your answer.

....

(1)

(Total 2 marks)

Q4.
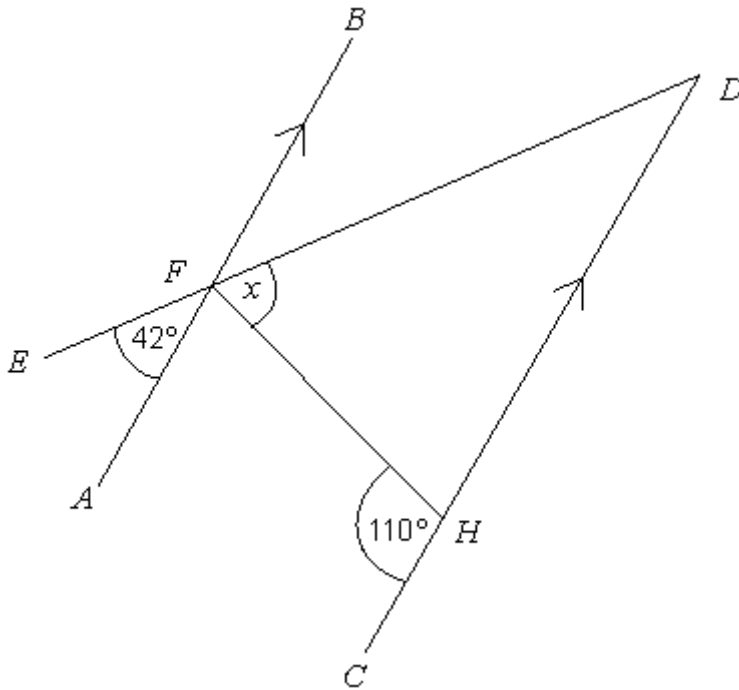
Diagram **NOT** accurately drawn
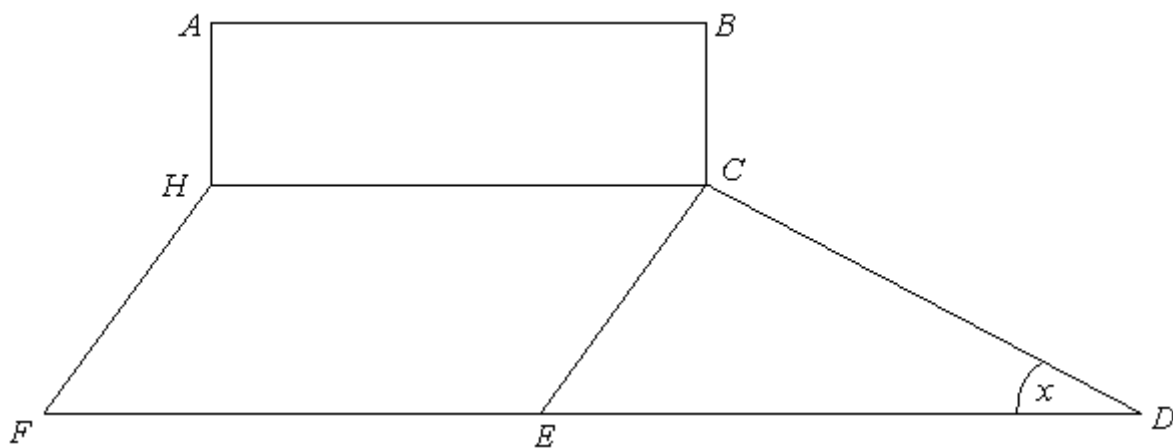
AFB and CHD are parallel lines.

EFD is a straight line.

Work out the size of the angle marked x.

$x =$ ....°

(Total 3 marks)

Q5.   The diagram shows a rectangle, a parallelogram and a triangle.

(a)   Mark with arrows (>>) a pair of parallel lines.

(1)

(b)   What type of angle is the angle marked x ?

....
(1)

(c)   Mark the angle HCE with the letter y.

(1)
(Total 3 marks)

Q6.
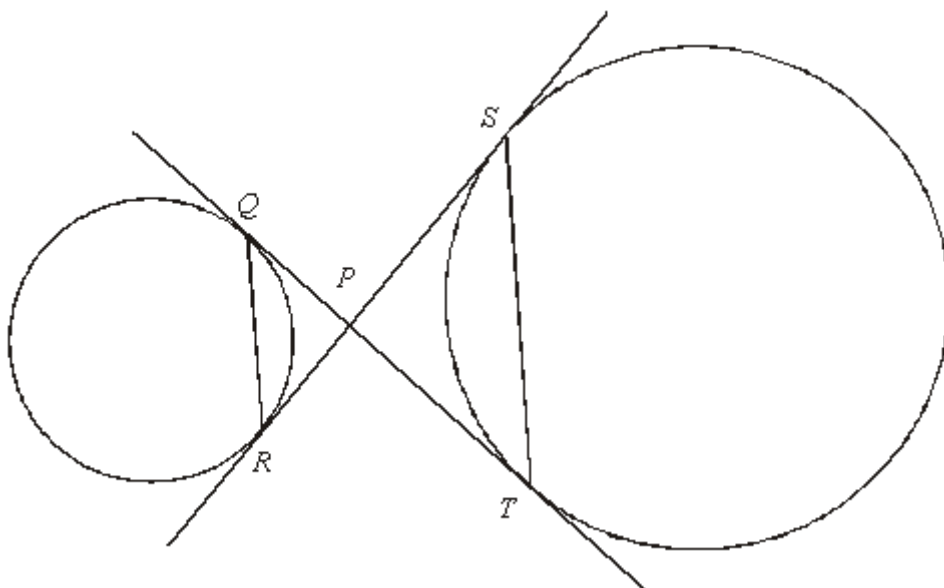
   Q and R are two points on the circumference of a circle.
S and T are two points on the circumference of another circle.

   QT and SR are tangents to both circles.
P is the point of intersection of the two tangents.

   Prove that QR is parallel to ST.

(Total 5 marks)

Q7.
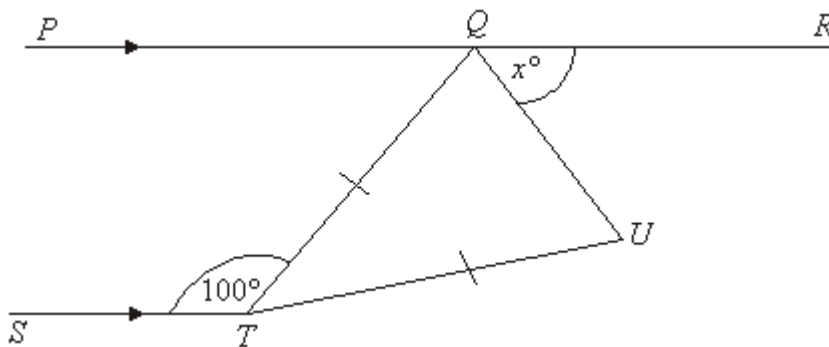
　PQR is a straight line parallel to *ST*.
QT = UT
Angle *STQ* = 100°.

Prove that angle *QTU* = (2*x* – 20)°.

(Total 5 marks)

Q8.
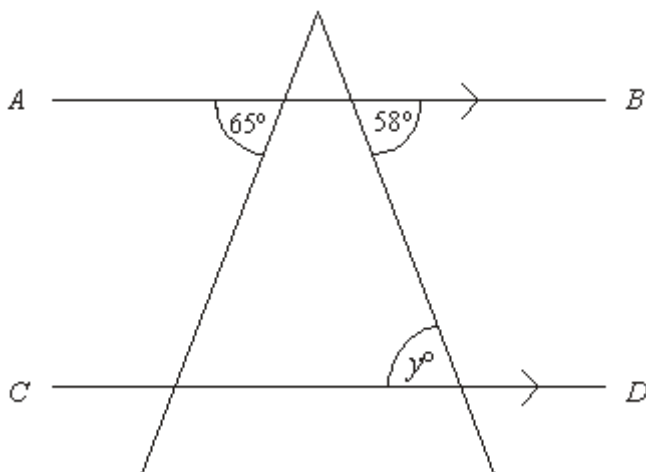
Diagram **NOT** accurately drawn

AB is parallel to *CD*.

(i)   Write down the value of *y*.

....

(ii)   Give a reason for your answer.

....

(Total 2 marks)

Q9.
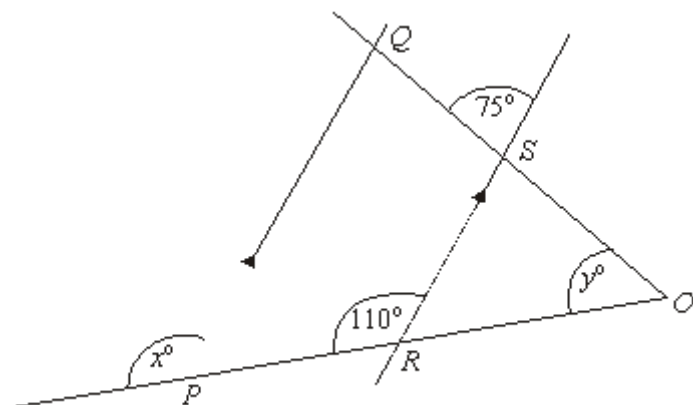
Diagram **NOT** accurately drawn

PQ is parallel to *RS*.

OSQ and *ORP* are straight lines.

(a)   (i)   Write down the value of x.

x = ...

(ii)   Give a reason for your answer.

....

(2)

(b)   Work out the value of *y*.

y = ...

(2)
(Total 4 marks)

Q10.
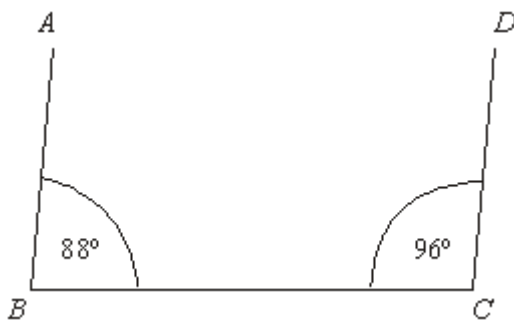
Diagram **NOT** accurately drawn

James says, "The lines AB and DC are parallel."

Ben says, "The lines AB and DC are **not** parallel."

Who is right, James or Ben?

....

Give a reason for your answer.

....

....

(Total 2 marks)

M1.

	Answer	Mark	Additional Guidance
(i)	127	2	**B1** for 127
(ii)	Alternate angles		**B1** for alternate angles (accept Z angles) or allied angles (co-interior angles) (= 180) or corresponding angles (accept F angles) **and** (vertically) opposite angles or corresponding angles (accept F angles) **and** angles on a straight line (= 180°) or allied angles (co-interior angles) **and** angles on a straight line (= 180°)
			Total for Question: 2 marks

M2.

Working	Answer	Mark	Additional Guidance
180 – 152	28	2	**M1** for 180 – 152 or x = [360 – 2(152)] ÷ 2 or 56 ÷ 2 seen **A1** cao
			Total for Question: 2 marks

M3.

	Answer	Mark	Additional Guidance
(a)	50	1	**B1** for 50 cao
(b)	Alternate (angles)	1	**B1** for alternate (angles) or co-interior (angles) or allied (angles) or any complete reason. (accept Z angles)
			Total for Question: 3 marks

M4.

Working	Answer	Mark	Additional Guidance
$BDF = 42°$ $GFB = 110°$ $110 - 42$	68	3	**M1** for EDC = 42 or DHF = 180–110 (=70) **M1** for 180 – 42 – 70 **A1** cao **OR** **M1** for BFD = 42° or BFH = 110° **M1** for 110 – 42 **A1** cao **OR** **M1** for AFH = 180 – 110 (=70°) **M1** for 180 – 70 – 42 **A1** cao
			Total for Question: 3 marks

M5.

	Answer	Mark	Additional Guidance

(a)	Pair of parallel lines	1	**B1** for any pair of parallel lines marked
(b)	Acute	1	**B1** cao
(c)	Correct angle marked	1	**B1** cao

Total for Question: 3 marks

M6.

	Working	Answer	Mark	Additional Guidance
QWC (i, ii, iii)	PS = PT and PQ = PR (equal tgts from a point) Let angle SPT = x	Proof	5	**B1** for PS = PT or PQ = PR **B1** for equal tangents from a point

Total for Question: 5 marks

M7.

	Working	Answer	Mark	Additional Guidance
QWC **(i, ii, iii)**	Angle RQT= 100° (alternate angles are equal) Angle TQU = 100 – x Angle QUT = 100 – x (base angles of isos triangle) Angle QTU = 180 – (100 – x + 100 – x) angles in a triangle)	Proof	5	**B1** for angle RQT = 100° **B1** for angle TQU = 100 – x or angle QUT = 100 – x **B1** for completing the proof **C2** for all 3 reasons given **QWC: Proof should be clearly laid out with technical language correct, e.g. alternate angles are equal** [C1 for just 1 or 2 reasons given] **QWC: Proof should be clearly laid out with technical language correct, e.g. alternate angles are equal**

Total for Question: 5 marks

M8.

Answer	Mark	Additional Guidance
58° Reason	2	**B1** cao **B1** (dep) alternate or Z angle (oe)

Total for Question: 2 marks

M9.

	Working	Answer	Mark	Additional Guidance
(a)(i)		110	2	**B1** cao **B1** (dep on **B1** in (i)) for corresponding angles **or** F angles
(ii)		Corresponding angles		
(b)	180 – 70 – 75	35	2	**M1** 180 – (180-110) – 75 or 110 – 75 **A1** cao

Total for Question: 4 marks

M10.

Answer	Mark	Additional Guidance
Ben with a valid reason	2	**B2** for Ben and a valid reason, eg 'it should be 180' or 'they are not supplementary (allied, co-interior)' oe This could be implied by 184 or 84 or 92 seen [**B1** for Ben and 88 + 96 or 180 – 88 or 180 – 96 seen or for just a valid reason given (eg without Ben or with James)]

Total for Question: 2 marks

E1.   **Foundation**

Fully correct answers to this question were only seen in 8% of cases. One mark was obtained in 35% of cases, almost always for giving the answer of 127º. The most common wrong answers in part (a) was of course 53º and in part (b) corresponding or F angles. Candidates found this question difficult because the alternate angles were not in the usual Z format but in the reverse Z orientation

Higher

84% of candidates gained the mark available in the first part of this question although it was surprising to see a significant number of candidates giving 53º as their answer. Whilst the diagram was not accurately drawn, it should have been fairly clear to candidates that y was not an acute angle. A full and complete reason, for example alternate (or Z) angles was required in order for the mark in part (ii) to be awarded. Many candidates gave "corresponding angles" as their reason without linking to either opposite angles or angles on a straight line. They could not be awarded this mark. Only 37% of candidates were awarded both marks in this question.

E2.   This question too was well answered with 53% of candidates giving the correct answer of 28°. There were however many candidates who gave the acute angle required the value of 152°, obviously guessing that the answer must be written in the question. A surprising number of candidates seemed to think that there are 380° in a surprising number of candidates seemed to think that there are 380° in a quadrilateral.

E3.   Nearly all candidates were successful in part (a) of this question.

However, although a good proportion of candidates were able to state that 50° and $x°$ were alternate or Z angles, many reasons were expressed too vaguely. For example, some candidates stated the angles were "opposite" to each other or that the two angles were "between parallel lines". Some candidates quoted "corresponding angles" or "angles

on a straight line add up to 180°", reasons which are incorrect by themselves. In this type of question the correct use of mathematical terms is needed. 96% of candidates scored at least one mark but only just over a half of the candidates could be awarded full marks in this question.

##

Foundation

Many failed to attempt this question, which is regrettable, since some of the diagram was accessible to all. The first mark was given to anyone who found a simple angle of many: this included some worked out from angles on a straight line or at a point. No reasoning was required: many chose to write on the diagram provided. However, it was important for candidates to identify which angles they were referring to in their working. A second angle could be worked out using properties of parallel lines, which then led to the required angle. There were a number of different routes of solution open to candidates, all of which could attract credit.

Higher

Many candidates were able to secure at least one mark having found a single angle using a straightforward angle rule such as opposite angle or angles on a straight line. Although this particular question did not require explanations, poor angle notation in calculations meant some candidates who did not reach the final answer lost part marks which may have otherwise been awarded. However, others labelled angles on the diagram and so did gain credit. Angle rules involving parallel lines presented more difficulties with many identifying the co-interior angle AFH as 110, equal to CHF rather than 70. Whilst candidates need to appreciate that a diagram such as this has not been accurately drawn, in this case considering whether the geometry would lead to an angle greater than or less than 90° would be a useful check on the reasonableness of an answer.

##

This question was well answered. In parts (a) & (c) some answers were spoilt with multiple lines and angles being indicated, but this was not common.

E8.   A surprising number of students could not identify the angle as being 58°, but gave either 65°, the other angle in the diagram, or 122°, the supplement of the 58°. Attempts at a reason varied from the technical ' alternate angles', the casual 'Z angles', the wrong 'corresponding angles', to the vague ' opposite angles on parallel lines'. Just quoting 'parallel lines' was insufficient to score the mark.

E9.   The angles of 110 and 35 were often correct but few gave the correct reason. Many just stated that the lines PQ and RS were parallel. Candidates had more success with part (b).

E10.   This question was very poorly answered, with many candidates realising that the lines were not parallel but unable to give acceptable explanations as to the reason. "Because the two angles are not the same" was the modal incorrect explanation given. Only a very few candidates carried out any calculation to justify their conclusion.