

ANGLES WITHIN PARALLEL LINES

DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 32

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2010]

Angles within Parallel Lines [4 Marks]

ABC is an isosceles triangle.
 $BA = BC$.
 PA is parallel to BC .
Angle $ACB = 70^\circ$.

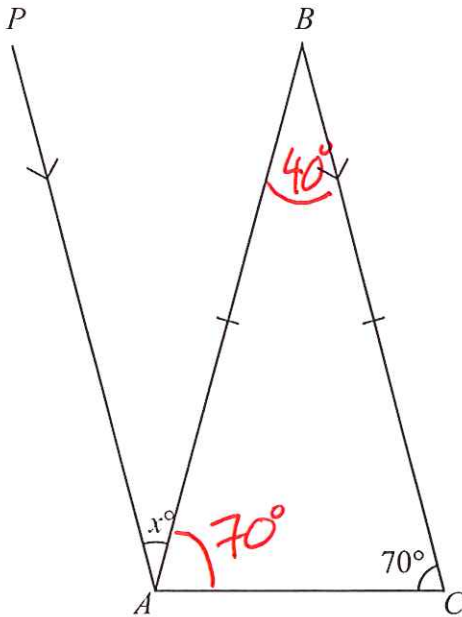


Diagram NOT
accurately drawn

Find the value of x .
Give a reason for each step in your working.

$$\angle CAB = 70^\circ \quad (\text{ABC IS AN ISOSCELES TRIANGLE})$$

$$\begin{aligned} \angle ABC &= 180 - 2 \times 70 \\ &= 40^\circ \quad (\text{ANGLES IN A TRIANGLE ADD TO } 180^\circ) \end{aligned}$$

$$x = 40^\circ \quad (\angle PAB \text{ AND } \angle ABC \text{ ARE ALTERNATE})$$

$$x = \dots 40^\circ \dots$$

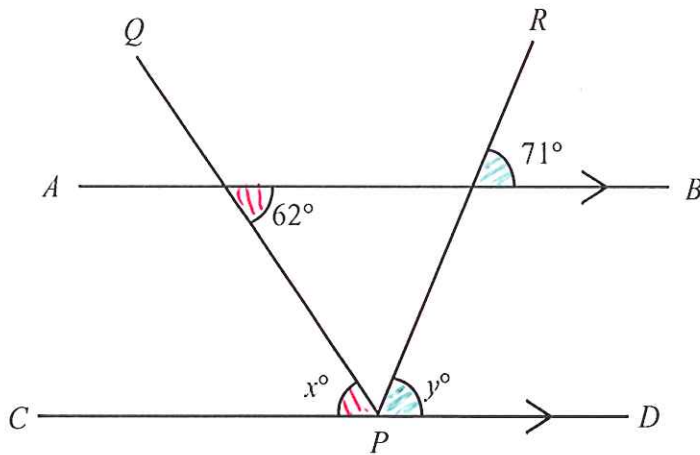


Diagram NOT
accurately drawn

AB and CD are parallel straight lines.
 PQ and PR are straight lines.

(a) (i) Find the value of x .



$$x = \dots 62^\circ \dots$$

(ii) Give a reason for your answer.

x AND 62° ARE ALTERNATE ANGLES
(2)

(b) (i) Find the value of y .



$$y = \dots 71^\circ \dots$$

(ii) Give a reason for your answer.

y AND 71° ARE CORRESPONDING ANGLES
(2)

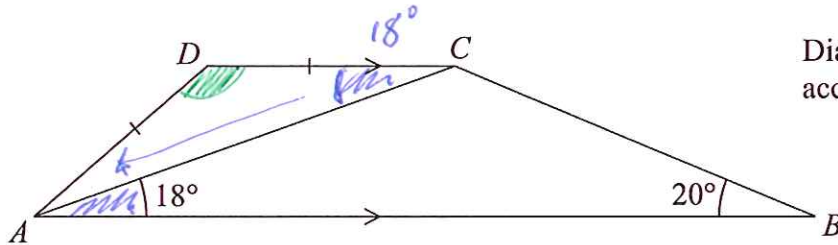


Diagram NOT
accurately drawn

$ABCD$ is a trapezium.

AB is parallel to DC .

Angle $BAC = 18^\circ$.

Angle $ABC = 20^\circ$.

$AD = DC$.

Calculate the size of angle ADC .

Give a reason for each step in your working.

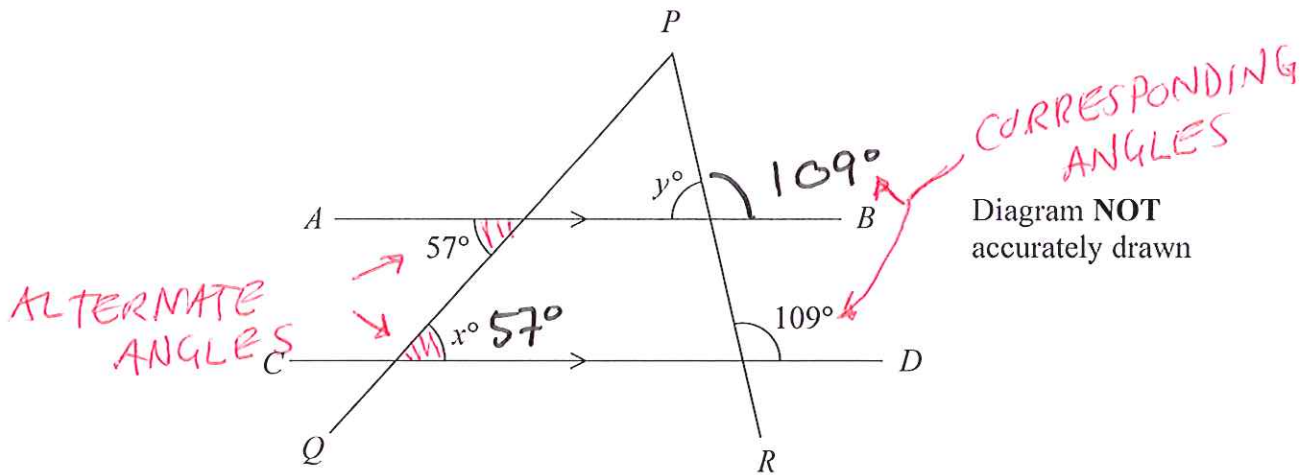
$$ACD = 18^\circ \quad \text{(m1)} \quad \left. \begin{array}{l} \text{CIT IS AN ALTERNATE ANGLE} \\ \text{TO BAC} \end{array} \right\} \begin{array}{l} \text{(m2)} \\ \text{EITHER} \end{array}$$

$$\therefore CAD = 18^\circ \quad \text{(m1)} \quad \text{(TRIANGLE ACD IS ISOSCELES)}$$

$$\begin{aligned} ADC &= 180 - \frac{2 \times 18}{\text{(m1)}} \\ &= \underline{\underline{144}} \end{aligned}$$

NOTE THAT
THE 20° ANGLE
WAS NOT USED!

$$\underline{\underline{144}}^\circ \quad \text{(AC)}$$



AB and CD are parallel straight lines.
 PQ and PR are straight lines.

- (a) (i) Find the value of x .

$$x = \dots 57^\circ \quad (1)$$

- (ii) Give a reason for your answer.

..... IT IS THE ALTERNATE ANGLE TO (1)
 THE 57° IN THE DIAGRAM (2)

- (b) Find the value of y .

Give a reason for each step in your working.

$$y = 180 - 109 \quad (1)$$

$$= 71$$

$$y = \dots 71 \quad (1)$$

(2)

In the diagram, ABC and ADE are straight lines.
 CE and BD are parallel.
 $AB = AD$.
 Angle $BAD = 38^\circ$.

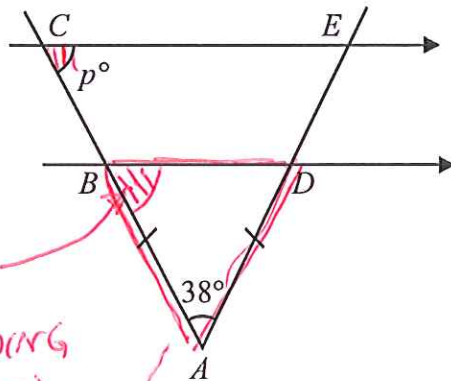
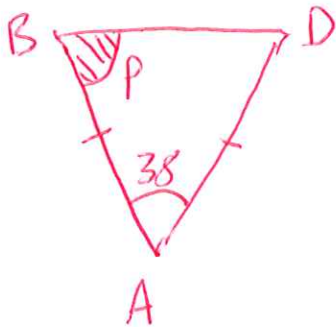


Diagram NOT
accurately drawn

P
(CORRESPONDING
ANGLES)

Work out the value of p .

Give a reason for each step in your working.



ANGLE $B = p^\circ$ BECAUSE IT
IS THE CORRESPONDING
ANGLE TO C (BI)

$$2p = 180 - 38 \quad (\text{mi})$$

$$= 142$$

$$p = \frac{142}{2} \quad (\text{mi})$$

$$= \underline{\underline{71^\circ}} \quad (\text{A1})$$

In the diagram, PQR and PST are straight lines.
 QS and RT are parallel lines.
 Angle $QRT = 70^\circ$.
 Angle $QST = 120^\circ$.

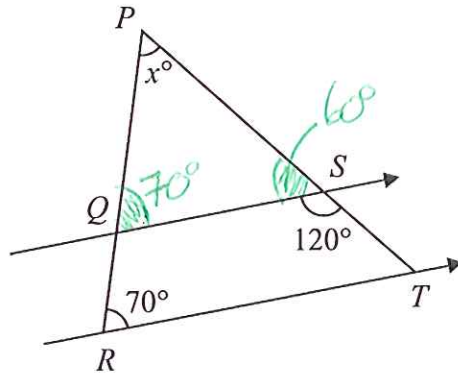


Diagram NOT
accurately drawn

(a) Work out the value of x .

$$180 - (\underbrace{70}_{(1)} + \underbrace{60}_{(1)})$$

$$x = \dots 50^\circ \dots \quad (3)$$

(b) Give a reason for each step in your working.

① $\angle PQS = 70^\circ$ BECAUSE IT 'CORRESPONDS'
TO $\angle PRT$. (1)

② $\angle PSQ = 60^\circ$ BECAUSE IT FORMS A
STRAIGHT LINE WITH $\angle QST$ (2)

(1)

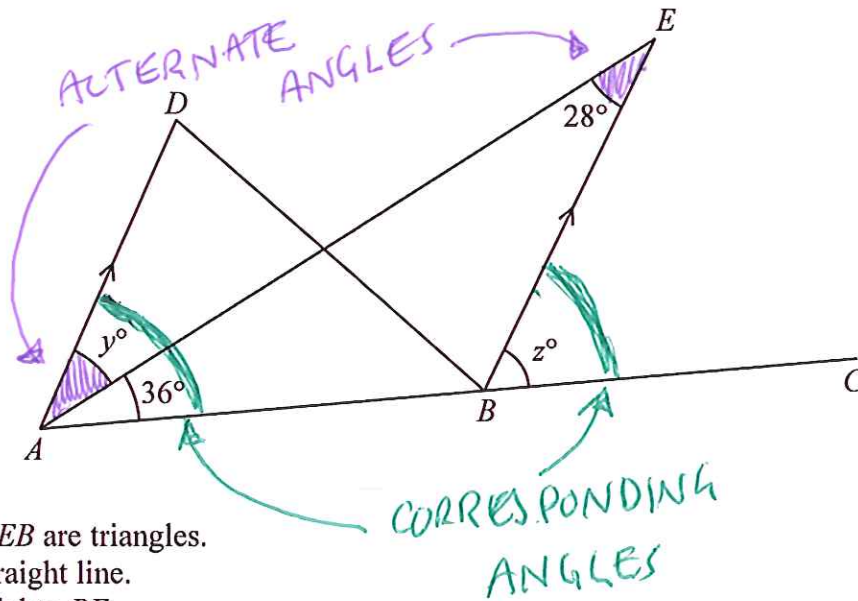


Diagram NOT
accurately drawn

ADB and AEB are triangles.
 ABC is a straight line.
 AD is parallel to BE .

(a) Find the value of y .



$$y = \frac{28^\circ}{(1)}$$

(b) Find the value of z .

$$28 + 36$$

(m)

$$z = \frac{64^\circ}{(2)}$$

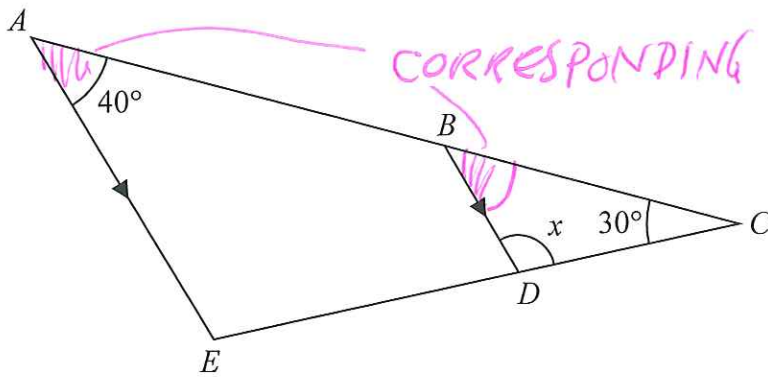


Diagram NOT
accurately drawn

ABC and EDC are straight lines.

AE is parallel to BD .

Angle $EAC = 40^\circ$

Angle $ACE = 30^\circ$

Work out the size of angle x .

Give reasons for your answer.

$\angle BDA = 40^\circ$ BECAUSE IT CORRESPONDS
TO ANGLE EAB



$$\begin{aligned} \therefore x &= 180 - (40 + 30) \text{ (m)} \\ &= \underline{\underline{110^\circ}} \end{aligned}$$

(A)

$x = \underline{\underline{110^\circ}}^\circ$

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There is no warranty that these solutions will meet Your requirements or provide the results which You want, or that they are complete, or that they are error-free. If You find anything confusing within these solutions then it is Your responsibility to seek clarification from Your teacher, tutor or mentor.

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The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or ‘best’ method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners’ mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners’ mark scheme.

B1 - This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of ‘follow through’).

M1 - This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board’s web site.

A1 - These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words ‘show that’, ‘show your working out’, or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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