

**TEST 13****Basic Geometrical Concepts  
and Properties**

Marks: /60

Time: 1 hour 30 minutes

Name: .....

Date: .....

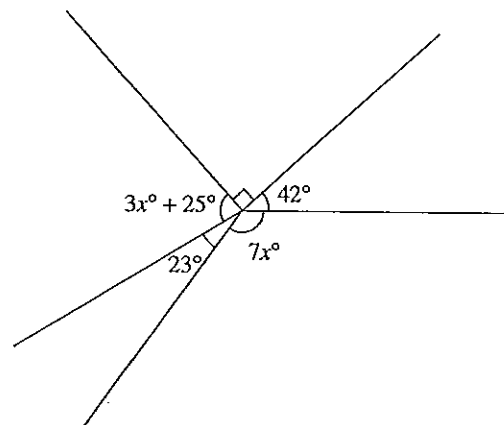
**INSTRUCTIONS TO CANDIDATES**

Section A (30 marks)

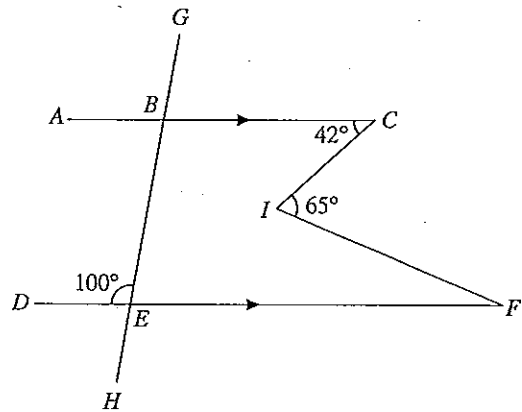
Time: 45 minutes

1. Answer all the questions in this section.
2. Calculators may not be used in this section.
3. All working must be clearly shown. Omission of essential working will result in loss of marks.
4. The marks for each question is shown in brackets [ ] at the end of each question.

- 1 Find the value of  $x$  in the diagram.

Answer  $x =$  ..... [2]State 2014/14 Gardeners Rd  
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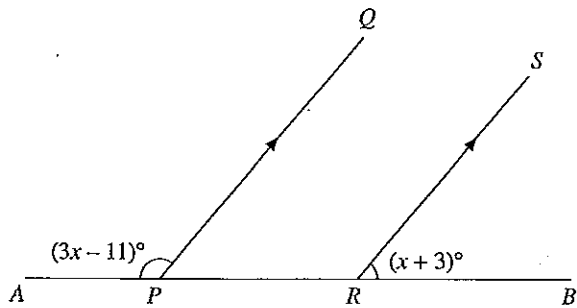
- 2 In the diagram  $AC$  is parallel to  $DF$ . The line  $GH$  intersects  $AC$  at  $B$  and  $DF$  at  $E$ . Given that  $\widehat{BCI} = 42^\circ$ ,  $\widehat{CIF} = 65^\circ$  and  $\widehat{BED} = 100^\circ$ , calculate
- $\widehat{DFI}$ ,
  - $\widehat{ABE}$ .



Answer (a)  $\widehat{DFI} = \dots\dots\dots^\circ$  [2]

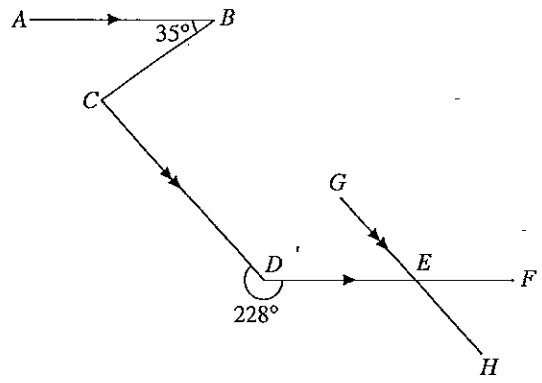
(b)  $\widehat{ABE} = \dots\dots\dots^\circ$  [1]

- 3 In the diagram  $PQ$  is parallel to  $RS$ .  $\widehat{APQ} = (3x - 11)^\circ$  and  $\widehat{BRS} = (x + 3)^\circ$ . Find the value of  $x$ .



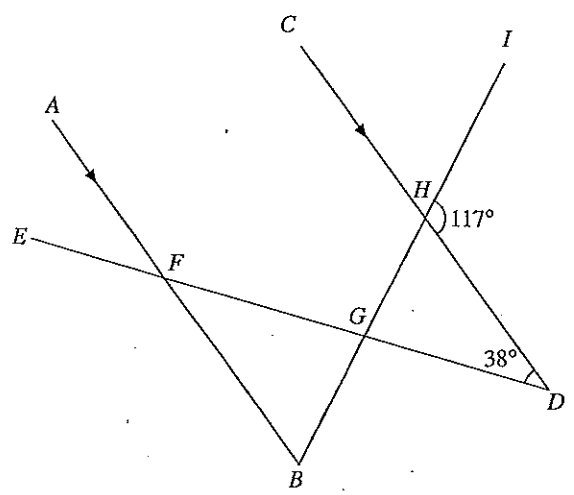
Answer  $x = \dots\dots\dots$  [2]

- 4  $AB$  is parallel to  $DEF$  and  $CD$  is parallel to  $GEH$ .  $\hat{ABC} = 35^\circ$  and reflex  $\hat{CDE} = 228^\circ$ .  
 Calculate  
 (a)  $\hat{BCD}$ ,  
 (b)  $\hat{FEH}$ .



Answer (a)  $\hat{BCD} = \dots\dots\dots^\circ$  [3]  
 (b)  $\hat{FEH} = \dots\dots\dots^\circ$  [1]

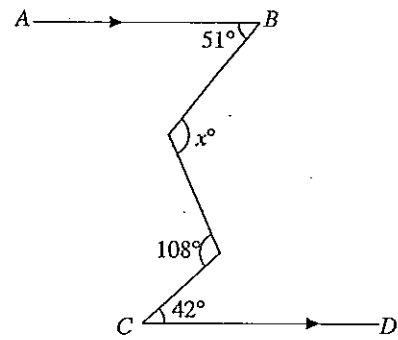
- 5 In the diagram  $AB$  is parallel to  $CD$ . Given that  $\hat{GDH} = 38^\circ$  and  $\hat{DHI} = 117^\circ$ , calculate  
 (a)  $\hat{BFG}$ ,  
 (b)  $\hat{AFE}$ ,  
 (c)  $\hat{FBG}$ .



Answer (a)  $\hat{BFG} = \dots\dots\dots^\circ$  [1]  
 (b)  $\hat{AFE} = \dots\dots\dots^\circ$  [1]  
 (c)  $\hat{FBG} = \dots\dots\dots^\circ$  [1]

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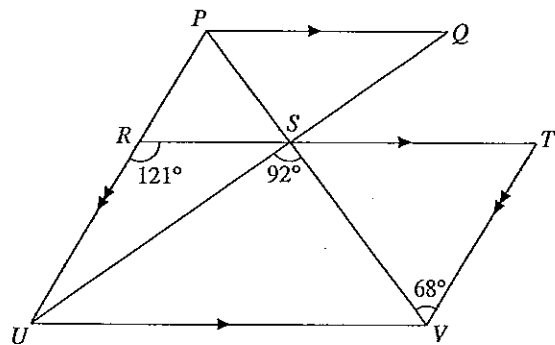
6 In the diagram  $AB$  is parallel to  $CD$ . Find the value of  $x$ .



Answer  $x = \dots\dots\dots$  [3]

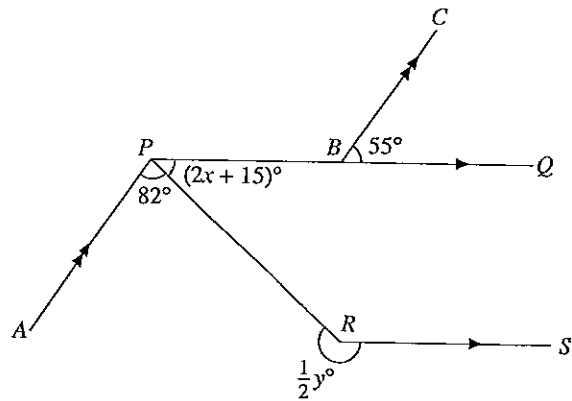
7 In the diagram  $PQ$  is parallel to  $RST$  and  $UV$ ,  $PRU$  is parallel to  $TV$ ,  $\widehat{USV} = 92^\circ$ ,  $\widehat{URS} = 121^\circ$  and  $\widehat{SVT} = 68^\circ$ . Calculate

- (a)  $\widehat{PSQ}$ ,
- (b)  $\widehat{RPS}$ ,
- (c)  $\widehat{STV}$ ,
- (d)  $\widehat{SPQ}$ .



- Answer (a)  $\widehat{PSQ} = \dots\dots\dots^\circ$  [1]  
 (b)  $\widehat{RPS} = \dots\dots\dots^\circ$  [1]  
 (c)  $\widehat{STV} = \dots\dots\dots^\circ$  [1]  
 (d)  $\widehat{SPQ} = \dots\dots\dots^\circ$  [1]

- 8 In the diagram  $PQ$  is parallel to  $RS$  and  $AP$  is parallel to  $BC$ .  $\widehat{APR} = 82^\circ$ ,  $\widehat{CBQ} = 55^\circ$ ,  $\widehat{BPR} = (2x + 15)^\circ$  and reflex  $\widehat{PRS} = \frac{1}{2}y^\circ$ . Find the values of  $x$  and  $y$ .

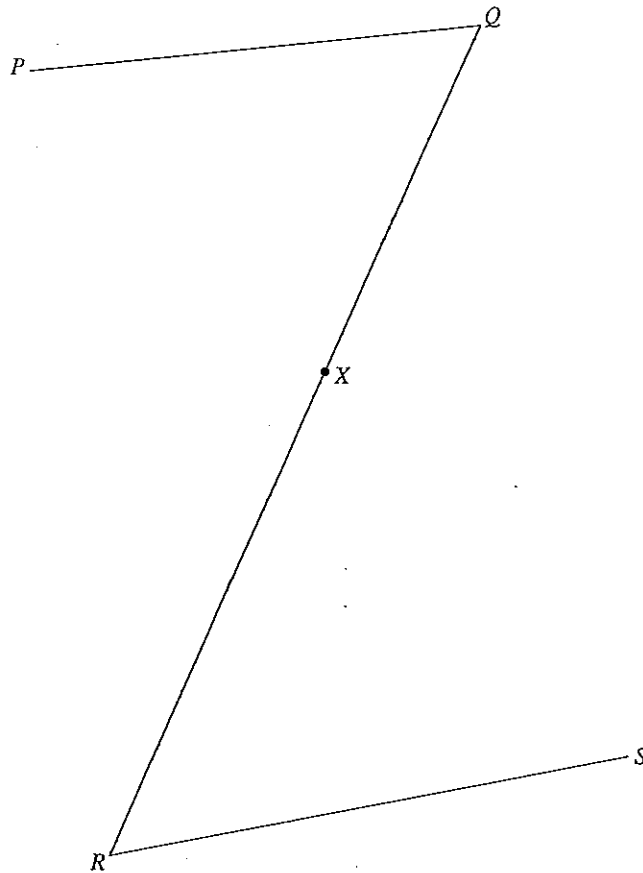


Answer  $x = \dots\dots\dots$  [2]

$y = \dots\dots\dots$  [2]

- 9 (a) On the diagram, construct
- (i) the angle bisector of  $\widehat{PQR}$ ,
  - (ii) a line passing through  $X$  and parallel to  $RS$ .
- (b) Mark with the letter  $Y$ , the point of intersection of the angle bisector and the parallel line through  $X$ .

Answer (a) (i), (ii), (b) [2]

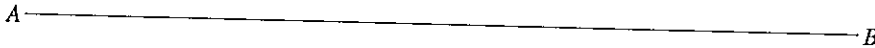


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- 10 (a) On the line  $AB$  given below, construct
- (i) the angle  $CAB$  such that  $\widehat{CAB} = 42^\circ$ ,
  - (ii) the perpendicular bisector of  $AB$ .
- (b) Mark with the letter  $C$ , the point of intersection of  $AC$  and the perpendicular bisector of  $AB$ . Measure and write down the length of  $AC$ .

Answer (a) (i), (ii) (b)

[2]



Answer (b)  $AC = \dots\dots\dots$  cm [1]

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# INSTRUCTIONS TO CANDIDATES

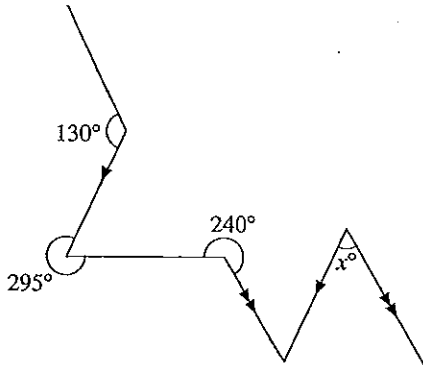
## Section B (30 marks)

Time: 45 minutes

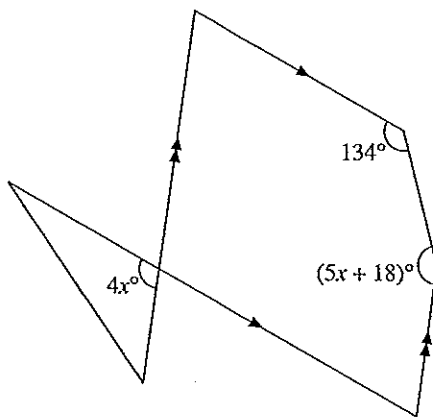
1. Answer all the questions in this section.
2. Calculators may be used in this section.
3. All working must be clearly shown. Omission of essential working will result in loss of marks.
4. The marks for each question is shown in brackets [ ] at the end of each question.

11 Find the value of  $x$  in each of the following.

(a)



(b)

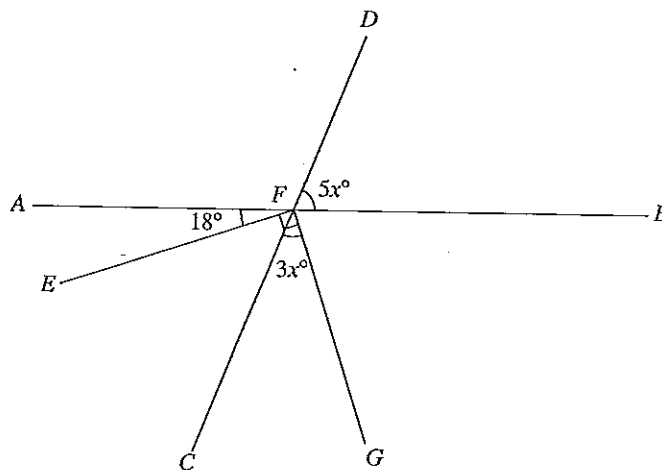


Answer (a)  $x = \dots\dots\dots$  [4]

(b)  $x = \dots\dots\dots$  [4]



- 12 In the diagram  $AFB$  and  $CFD$  are straight lines.  $\widehat{AFE} = 18^\circ$ ,  $\widehat{EFG} = 90^\circ$ ,  $\widehat{CFG} = 3x^\circ$  and  $\widehat{BFD} = 5x^\circ$ . Find
- $x$ ,
  - $\widehat{EFC}$ ,
  - $\widehat{AFD}$ .



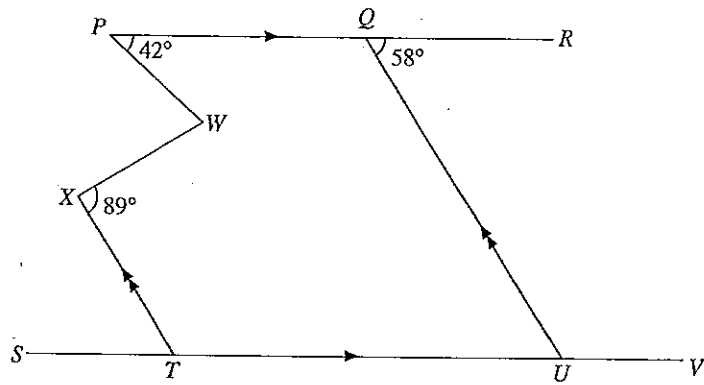
Answer (a)  $x = \dots\dots\dots$  [3]

(b)  $\widehat{EFC} = \dots\dots\dots^\circ$  [1]

(c)  $\widehat{AFD} = \dots\dots\dots^\circ$  [1]

13 In the diagram  $PR$  is parallel to  $SV$  and  $TX$  is parallel to  $UQ$ . Given that  $\widehat{WPQ} = 42^\circ$ ,  $\widehat{TXW} = 89^\circ$  and  $\widehat{UQR} = 58^\circ$ , calculate

- (a)  $\widehat{QUT}$ ,
- (b)  $\widehat{UTX}$ ,
- (c) reflex  $\widehat{PWX}$ .

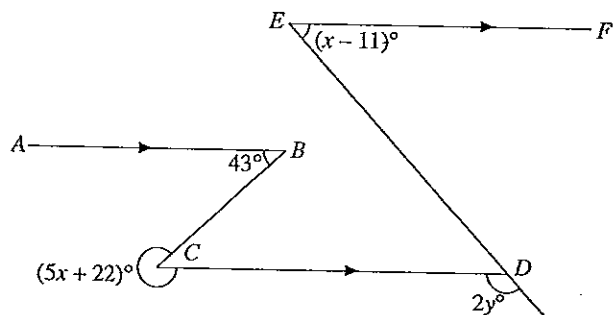


Answer (a)  $\widehat{QUT} = \dots\dots\dots^\circ$  [1]

(b)  $\widehat{UTX} = \dots\dots\dots^\circ$  [1]

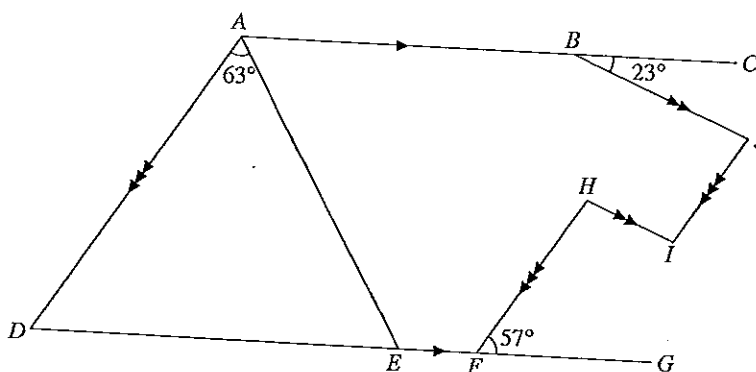
(c) reflex  $\widehat{PWX} = \dots\dots\dots^\circ$  [3]

- 14 (a) In the diagram  $AB$ ,  $CD$  and  $EF$  are parallel. Find the values of  $x$  and  $y$ .



- (b) In the diagram  $AC$  is parallel to  $DG$ ,  $BJ$  is parallel to  $HI$  and  $AD$  is parallel to  $HF$  and  $JI$ . Given that  $\hat{DAE} = 63^\circ$ ,  $\hat{HFG} = 57^\circ$  and  $\hat{CBJ} = 23^\circ$ , calculate

- (i)  $\hat{EAB}$ ,  
(ii)  $\hat{HIJ}$ .



Answer (a)  $x = \dots\dots\dots$  [2]

$y = \dots\dots\dots$  [2]

(b) (i)  $\hat{EAB} = \dots\dots\dots^\circ$  [2]

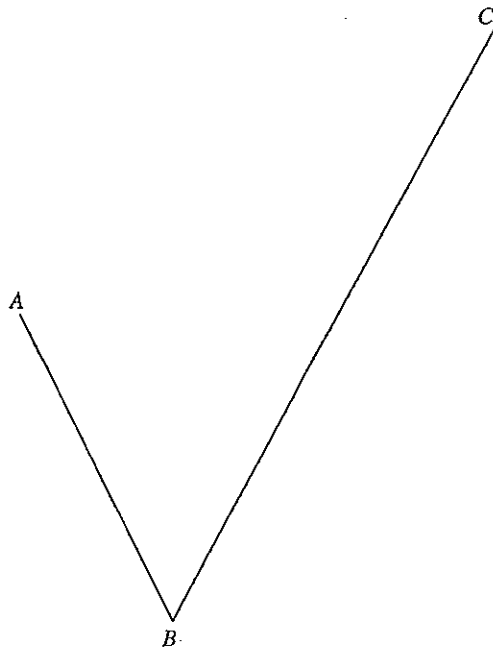
(ii)  $\hat{HIJ} = \dots\dots\dots^\circ$  [2]

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- 15 (a) On the diagram construct
- (i) a line perpendicular to  $AB$ , passing through  $A$ ,
  - (ii) a line parallel to  $BC$  and passing through  $A$ .
- (b) The line perpendicular to  $A$  intersects the line  $BC$  at  $D$ .
- (i) Mark and label the point  $D$  on the diagram.
  - (ii) Measure and write down the length of  $BD$  and the size of  $\hat{A}DB$ .

Answer (a) (i), (ii), (b) (i)

[2]



Answer (b) (ii)  $BD = \dots\dots\dots$  cm

$\hat{A}DB = \dots\dots\dots^\circ$  [2]

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14. (a)



**Teacher's Tip**

To calculate the percentage discount, find the amount he saved.

$$\begin{aligned} \text{Amount saved} &= \$80\,000 - \$73\,200 \\ &= \$6800 \end{aligned}$$

$$\begin{aligned} \text{Percentage discount} &= \frac{\$6800}{\$80\,000} \times 100\% \\ &= 8.5\% \end{aligned}$$



**Teacher's Tip**

The percentage discount is calculated based on the selling price, i.e. \$80 000 and not on the amount paid, i.e. \$73 200.

(b) (i) Amount paid by hire purchase

$$\begin{aligned} &= \$6800 + (60 \times \$1433.50) \\ &= \$6800 + \$86\,010 \end{aligned}$$

$5 \text{ yrs} = 5 \times 12$   
 $= 60 \text{ mths}$

$$= \$92\,810$$

$$\begin{aligned} \text{Extra cost incurred} &= \$92\,810 - \$80\,000 \\ &= \$12\,810 \end{aligned}$$

(ii) Principal,  $P = \$80\,000 - \$6800$   
 $= \$73\,200$

Interest,  $I = \$12\,810$ ; Time,  $T = 5$  yrs;  
 Rate,  $R = ?$

$$I = \frac{PRT}{100}$$

$$\$12\,810 = \frac{\$73\,200 \times R \times 5}{100}$$

$$R = \frac{\$12\,810 \times 100}{\$73\,200 \times 5}$$

$$= 3.5\%$$

$\therefore$  the rate of interest charged per annum is 3.5%.



**Teacher's Tip**

The extra cost incurred is the amount of interest to be paid through the hire purchase scheme. Interest is only charged on \$73 200, i.e. after deducting the deposit.

15. (a) Total monthly basic salary in 2002

$$\begin{aligned} &= 12 \times \$5750 \\ &= \$69\,000 \end{aligned}$$

Bonus received in 2002  
 $= 0.85\%$  of \$1.2 million

$$\begin{aligned} &= \frac{0.85}{100} \times \$1\,200\,000 \\ &= \$10\,200 \end{aligned}$$

$$\begin{aligned} \text{Total income in 2002} &= \$69\,000 + \$10\,200 \\ &= \$79\,200 \end{aligned}$$

(b) (i) Total basic salary in 2002 is \$69 000.

$$\begin{aligned} \text{Total basic salary in 2003} &= 103.2\% \text{ of } \$69\,000 \\ &= \frac{103.2}{100} \times \$69\,000 \\ &= \$71\,208 \end{aligned}$$

(ii) Bonus received in 2003

$$\begin{aligned} &= \$78\,484 - \$71\,208 \\ &= \$7276 \\ 0.85\% &= \$7276 \end{aligned}$$

$$100\% - \frac{100}{0.85} \times \$7276 = \$856\,000$$

$\therefore$  the value of the sales in 2003 is \$856 000.

**Test 13: Basic Geometrical Concepts and Properties**

**Section A**

1.  $90^\circ + (3x^\circ + 25^\circ) + 23^\circ + 7x^\circ + 42^\circ = 360^\circ$  ( $\angle$ s at a point)

$$10x^\circ + 180^\circ = 360^\circ$$

$$10x^\circ = 180^\circ$$

$$x^\circ = \frac{180^\circ}{10}$$

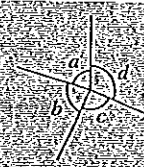
$$x^\circ = 18^\circ$$

$$\therefore x = 18$$

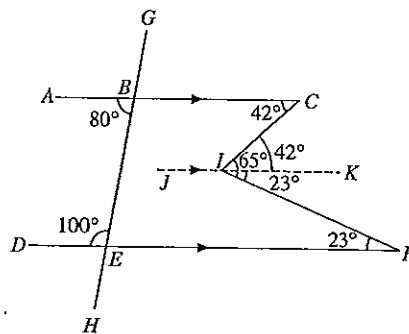


**Teacher's Tip**

The sum of angles at a point is  $360^\circ$ .  
 $a + b + c + d = 360^\circ$  ( $\angle$ s at a pt.)



2.



(a) Draw the line  $JK$  parallel to  $AC$ .

$$\hat{C}JK = 42^\circ \text{ (alt. } \angle\text{s, } AC \parallel JK)$$

$$\hat{K}JF = 65^\circ - 42^\circ$$

$$= 23^\circ$$

$$\hat{D}FI = 23^\circ \text{ (alt. } \angle\text{s, } JK \parallel DF)$$

(b)  $\hat{A}BE = 180^\circ - 100^\circ$  (int.  $\angle$ s,  $AC \parallel DF$ )  
 $= 80^\circ$

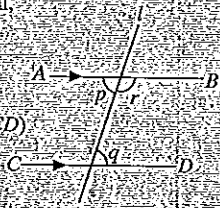
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**Teacher's Tip**

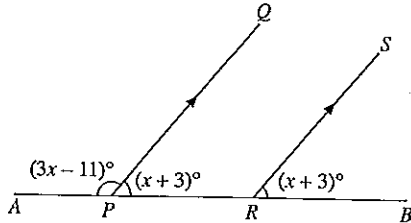
When we have two parallel lines cut by a transversal,  $l$

(a) the alternate angles are equal.  
 $p = q$  (alt.  $\angle$ s,  $AB \parallel CD$ )

(b) the interior angles are supplementary.  
 $q + r = 180^\circ$  (int.  $\angle$ s,  $AB \parallel CD$ )



3.

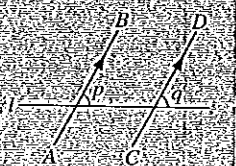


$$\begin{aligned} \widehat{QPR} &= (x + 3)^\circ \text{ (corr. } \angle\text{s, } PQ \parallel RS) \\ (3x - 11)^\circ + (x + 3)^\circ &= 180^\circ \text{ (adj. } \angle\text{s on a str. line)} \\ 4x &= 180 + 8 \\ 4x &= 188 \\ x &= \frac{188}{4} = 47 \end{aligned}$$

**Teacher's Tip**

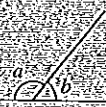
1. When two parallel lines are cut by a transversal,  $l$ , the corresponding angles are equal.

$$p = q \text{ (corr. } \angle\text{s, } AB \parallel CD)$$

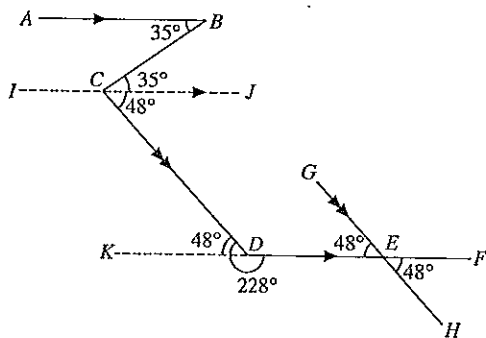


2. The sum of adjacent angles on a straight line is equal to  $180^\circ$ .

$$a + b = 180^\circ \text{ (adj. } \angle\text{s on a str. line)}$$



4.



- (a) Draw the line  $IJ$  passing through  $C$  and parallel to  $AB$ . Produce  $FD$  to  $K$ .
- $$\begin{aligned} \widehat{BCJ} &= 35^\circ \text{ (alt. } \angle\text{s, } AB \parallel IJ) \\ \widehat{CDK} &= 228^\circ - 180^\circ \text{ (A straight angle is } 180^\circ) \\ &= 48^\circ \end{aligned}$$

$$\widehat{JCD} = 48^\circ \text{ (alt. } \angle\text{s, } IJ \parallel KF)$$

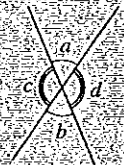
$$\begin{aligned} \therefore \widehat{BCD} &= \widehat{BCJ} + \widehat{JCD} \\ &= 35^\circ + 48^\circ \\ &= 83^\circ \end{aligned}$$

- (b)  $\widehat{GED} = 48^\circ$  (corr.  $\angle$ s,  $CD \parallel GH$ )  
 $\widehat{FEH} = 48^\circ$  (vert. opp.  $\angle$ s)

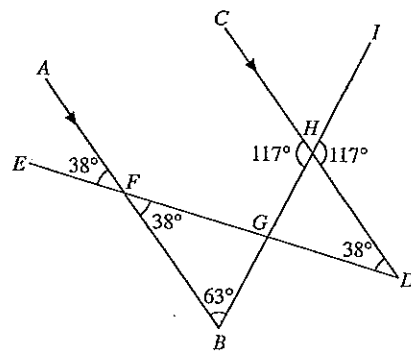
**Teacher's Tip**

Vertically opposite angles are equal.

$$\begin{aligned} a &= b \\ c &= d \text{ (vert. opp. } \angle\text{s)} \end{aligned}$$

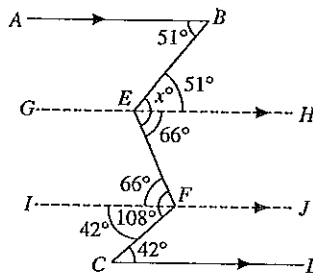


5. (a)



- (i)  $\widehat{BFG} = 38^\circ$  (alt.  $\angle$ s,  $AB \parallel CD$ )  
 (ii)  $\widehat{AFE} = 38^\circ$  (vert. opp.  $\angle$ s)  
 (iii)  $\widehat{CHG} = 117^\circ$  (vert. opp.  $\angle$ s)  
 $\widehat{FBG} = 180^\circ - 117^\circ$  (int.  $\angle$ s,  $AB \parallel CD$ )  
 $= 63^\circ$

6.



At the points  $E$  and  $F$ , draw two lines parallel to  $AB$  as shown.

$$\begin{aligned} \widehat{BEH} &= 51^\circ \text{ (alt. } \angle\text{s, } AB \parallel GH) \\ \widehat{IFC} &= 42^\circ \text{ (alt. } \angle\text{s, } IJ \parallel CD) \\ \widehat{HEF} &= \widehat{EFI} \text{ (alt. } \angle\text{s, } GH \parallel IJ) \\ &= 108^\circ - 42^\circ \\ &= 66^\circ \\ x^\circ &= \widehat{BEH} + \widehat{HEF} \\ &= 51^\circ + 66^\circ \\ &= 117^\circ \\ \therefore x &= 117 \end{aligned}$$

7. (a)  $\widehat{PSQ} = 92^\circ$  (vert. opp.  $\angle$ s)  
 (b)  $\widehat{RPS} = 68^\circ$  (alt.  $\angle$ s,  $PU \parallel TV$ )  
 (c)  $\widehat{STV} = 180^\circ - 121^\circ$  (int.  $\angle$ s,  $PU \parallel TV$ )  
 $= 59^\circ$   
 (d)  $\widehat{RPQ} = 121^\circ$  (corr.  $\angle$ s,  $PQ \parallel RT$ )  
 $\widehat{RPS} + \widehat{SPQ} = 121^\circ$   
 $68^\circ + \widehat{SPQ} = 121^\circ$   
 $\widehat{SPQ} = 121^\circ - 68^\circ = 53^\circ$

8.  $\widehat{PBC} = 180^\circ - 55^\circ$  (adj.  $\angle$ s on a str. line)  
 $= 125^\circ$

$\widehat{APB} = 125^\circ$  (alt.  $\angle$ s,  $AP \parallel BC$ )

$82^\circ + (2x + 15)^\circ = 125^\circ$

$2x = 125 - 82 - 15$

$= 28$

$x = \frac{28}{2} = 14$

$\widehat{BPR} = (2x + 15)^\circ$

$= [2(14) + 15]^\circ$

$= 43^\circ$

$\widehat{PRS} = 180^\circ - 43^\circ$  (int.  $\angle$ s,  $PQ \parallel RS$ )

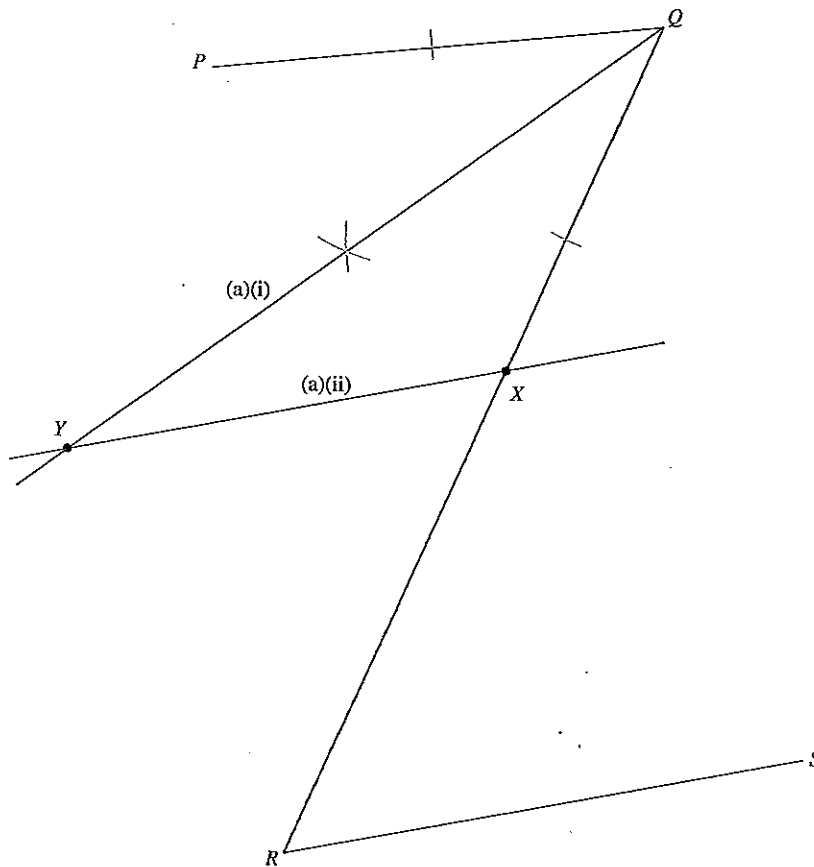
$= 137^\circ$

$\frac{1}{2}y^\circ + 137^\circ = 360^\circ$  ( $\angle$ s at a pt.)

$\frac{1}{2}y = 223$

$y = 223 \times 2 = 446$

9.

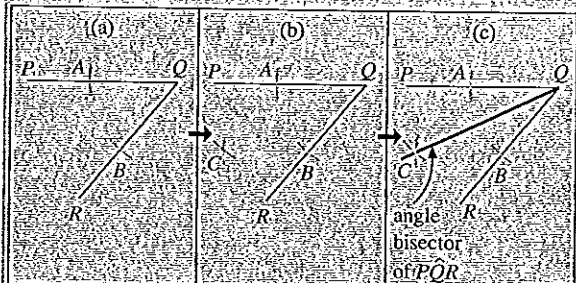




### Teacher's Tip

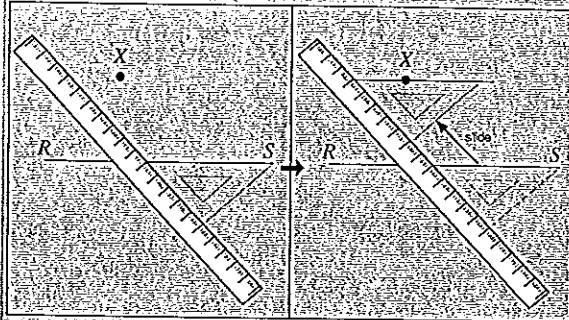
1. To construct the angle bisector of  $\angle PQR$ :

- (a) Use a pair of compasses and with  $Q$  as centre, mark an arc to cut  $PQ$  at  $A$  and an arc to cut  $QR$  at  $B$ .
- (b) Using the same radius, with  $A$  and  $B$  as centres, draw two arcs to intersect at  $C$ .
- (c) Draw a straight line from  $Q$  through  $C$ .  
 $QC$  is the angle bisector of  $\angle PQR$ .

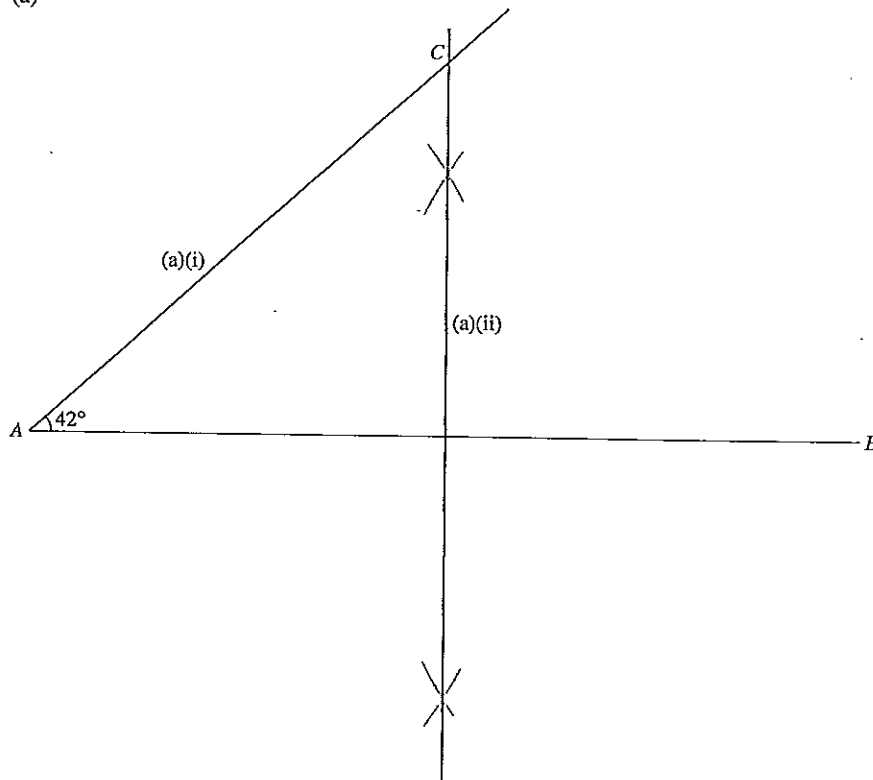


2. To draw a line through  $X$  which is parallel to  $RS$ :

- (a) Place the set square on line  $RS$  and ruler as shown.
- (b) Slide the set square along the length of the ruler until it passes through the point  $X$ .
- (c) Draw the line passing through  $X$  which is parallel to  $RS$ .



10. (a)

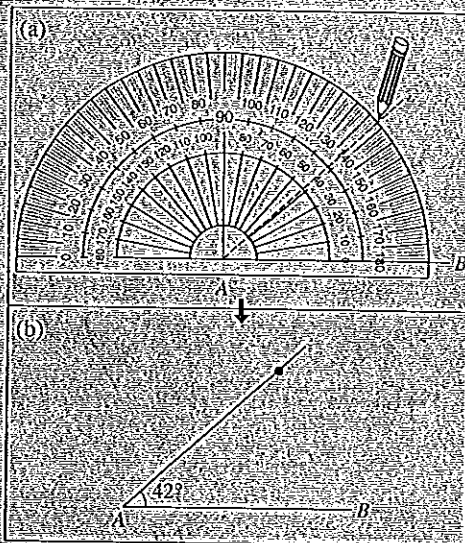


(b)  $AC = 7.4$  cm

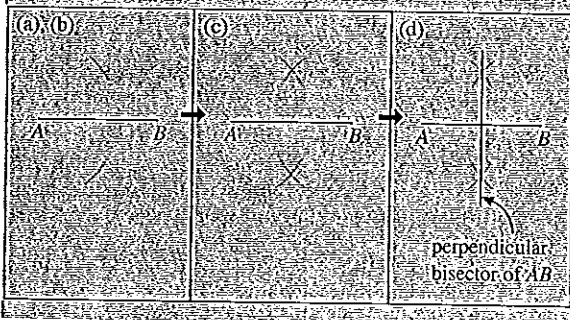


**Teacher's Tip**

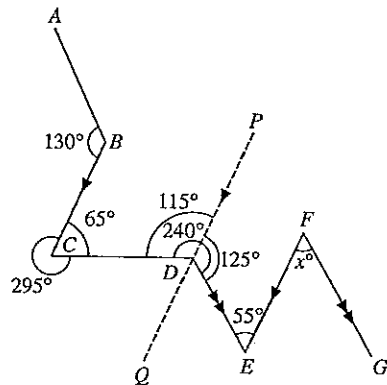
- To draw angle  $\widehat{CAB}$  such that  $\widehat{CAB} = 42^\circ$ 
  - Place a protractor such that its centre is at  $A$  and its base is along  $AB$  as shown.
  - Mark a point on the  $42^\circ$  graduation with your pencil. Join the point to  $A$  and we have  $\widehat{CAB} = 42^\circ$ .



- To construct the perpendicular bisector of  $AB$ 
  - Set your compasses to more than half the length of  $AB$ .
  - With  $A$  as centre, mark arcs above and below  $AB$ .
  - Repeat the process with  $B$  as centre.
  - Draw a straight line passing through the two sets of intersecting arcs.

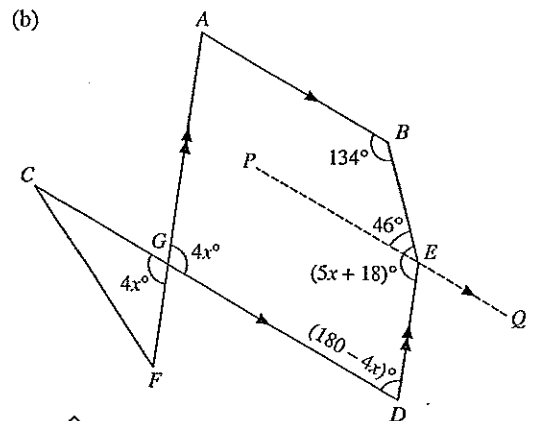


11. (a)



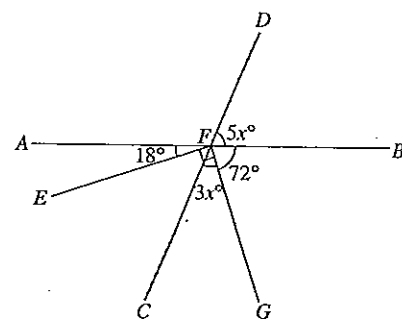
Draw line  $PQ$  through  $D$  parallel to  $BC$  and  $FE$ .

$$\begin{aligned} \widehat{BCD} &= 360^\circ - 295^\circ \text{ (}\angle\text{s at a pt.)} \\ &= 65^\circ \\ \widehat{CDP} &= 180^\circ - 65^\circ \text{ (int. } \angle\text{s, } BC \parallel PQ) \\ &= 115^\circ \\ \widehat{PDE} &= 240^\circ - 115^\circ \\ &= 125^\circ \\ \widehat{DEF} &= 180^\circ - 125^\circ \text{ (int. } \angle\text{s, } PQ \parallel FE) \\ &= 55^\circ \\ x^\circ &= \widehat{DEF} \text{ (alt. } \angle\text{s, } DE \parallel FG) \\ &= 55^\circ \\ \therefore x &= 55 \end{aligned}$$



$$\begin{aligned} \widehat{AGD} &= 4x^\circ \text{ (vert. opp. } \angle\text{s)} \\ \widehat{GDE} &= (180 - 4x)^\circ \text{ (int. } \angle\text{s, } GA \parallel DE) \\ \text{Draw the line } PQ \text{ through } E \text{ parallel to } AB. \\ \widehat{PEB} &= 180^\circ - 134^\circ \text{ (int. } \angle\text{s, } AB \parallel PQ) \\ &= 46^\circ \\ \widehat{PED} &= (5x + 18)^\circ - 46^\circ \\ &= (5x - 28)^\circ \\ \widehat{PED} + \widehat{GDE} &= 180^\circ \text{ (int. } \angle\text{s, } PQ \parallel GD) \\ (5x - 28)^\circ + (180 - 4x)^\circ &= 180^\circ \\ x^\circ &= 28^\circ \\ \therefore x &= 28 \end{aligned}$$

12. (a)



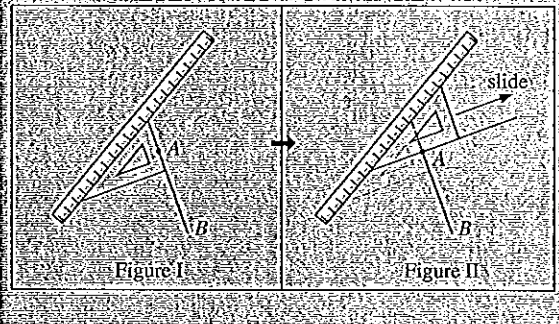
$$\begin{aligned} \widehat{GFB} &= 180^\circ - 18^\circ - 90^\circ \text{ (adj. } \angle\text{s on a str. line)} \\ &= 72^\circ \\ 3x^\circ + 72^\circ + 5x^\circ &= 180^\circ \text{ (adj. } \angle\text{s on a str. line)} \\ 8x &= 180 - 72 \\ 8x &= 108 \\ x &= \frac{108}{8} = 13.5 \end{aligned}$$



**Teacher's Tip**

To construct a line perpendicular to  $AB$  passing through  $A$ :

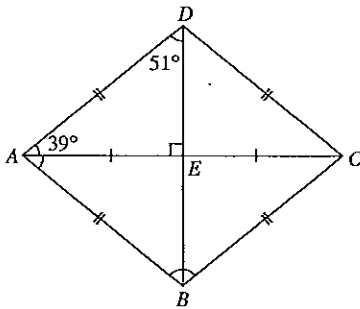
- Place set square on line  $AB$  and ruler as shown in Figure I.
- Slide set square along the length of the ruler until the edge of the set square passes through  $A$  as shown in Figure II. Draw the line passing through  $A$  and perpendicular to  $AB$ .



**Test 14: Angle Properties of Triangles and Quadrilaterals**

**Section A**

1.

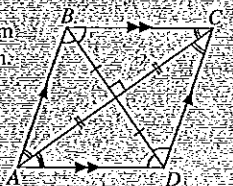


(a)  $\hat{BAE} = \hat{DAE}$   
 $= 180^\circ - 51^\circ - 90^\circ$   
 $= 39^\circ$

- Since  $AE = EC$ ,  $DEB$  is a diagonal. The diagonals of a rhombus bisect each other at right angles.
- $\hat{BAE} = \hat{DAE}$  since the diagonal  $AC$  bisect  $\hat{DAB}$ .

**Teacher's Tip**

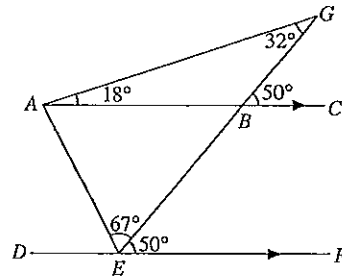
- A rhombus is a parallelogram with all sides equal in length.
- The diagonals bisect each other at right angles.
- Opposite angles are equal.
- The diagonals bisect the angles.



(b)  $\hat{ABC} = \hat{ADC}$   
 $= 2 \times 51^\circ$   
 $= 102^\circ$

Opposite angles are equal.

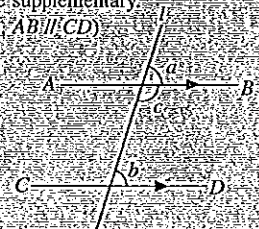
2.



- $\hat{BEF} = 50^\circ$  (corr.  $\angle$ s,  $AC \parallel DF$ )
- $\hat{AGB} + 18^\circ = 50^\circ$  (ext.  $\angle =$  sum of int. opp.  $\angle$ s)  
 $\hat{AGB} = 50^\circ - 18^\circ = 32^\circ$
- $\hat{EAB} + \hat{AEF} = 180^\circ$  (int.  $\angle$ s,  $AC \parallel DF$ )  
 $\hat{EAB} + 67^\circ + 50^\circ = 180^\circ$   
 $\hat{EAB} = 180^\circ - 67^\circ - 50^\circ$   
 $= 63^\circ$

**Teacher's Tip**

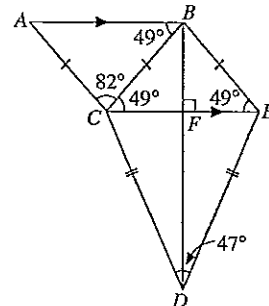
- When two parallel lines are cut by a transversal,  $l$ :
  - the corresponding angles are equal:  
 $a = b$  (corr.  $\angle$ s,  $AB \parallel CD$ )
  - the interior angles are supplementary:  
 $b + c = 180^\circ$  (int.  $\angle$ s,  $AB \parallel CD$ )



- The exterior angle of a triangle is equal to the sum of the interior opposite angles.  
 $a = b + c$  (ext.  $\angle =$  sum of int. opp.  $\angle$ s)



3.



Since  $BCDE$  is a kite,  
 $BC = BE$  and  $DC = DE$ .