

TEST 13

Basic Geometrical Concepts
and Properties

Marks: /60

Time: 1 hour 30 minutes

Name:

Date:

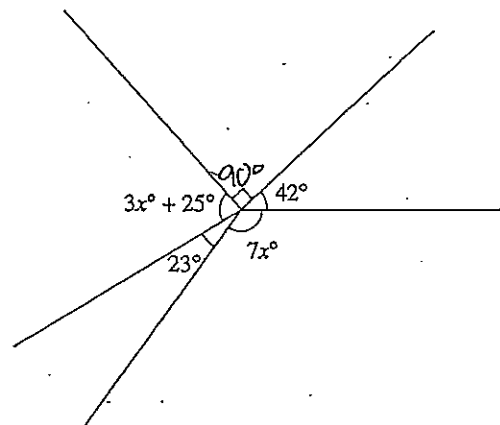
INSTRUCTIONS TO CANDIDATES

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.

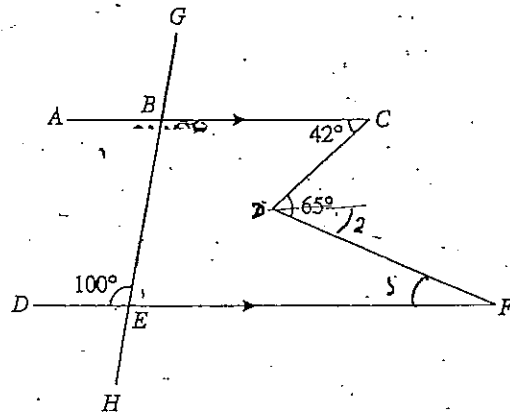
- 1 Find the value of x in the diagram.



Answer $x =$ [2]

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

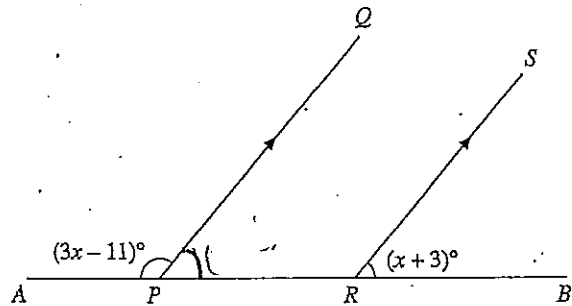
- (a) \widehat{DFI} ,
 (b) \widehat{ABE} .



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

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

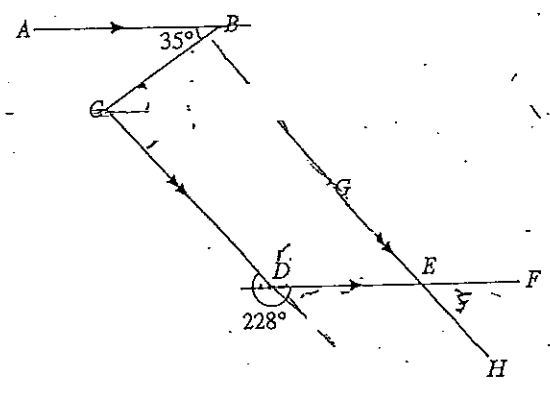
3. In the diagram PQ is parallel to RS . $\widehat{APQ} = (3x - 11)^\circ$ and $\widehat{BRS} = (x + 3)^\circ$. Find the value of x .



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

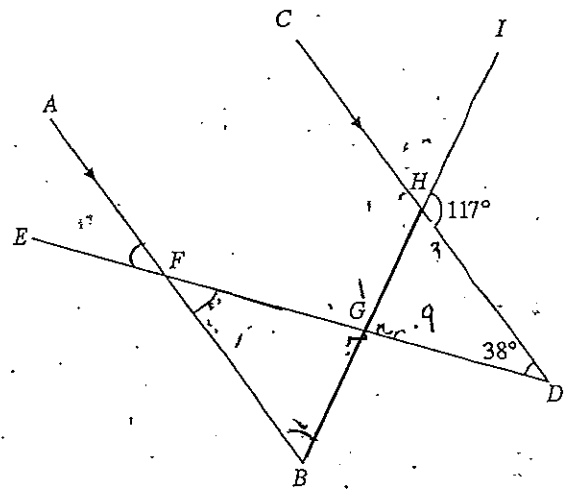
CEM TUMON
 Tel: 9988 3331

- 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]

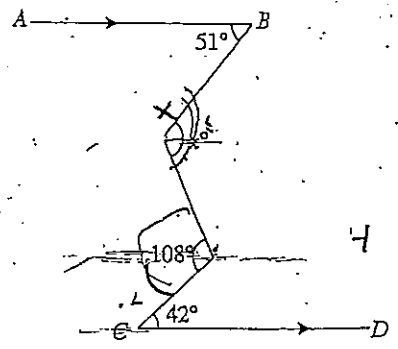
- 5 In the diagram AB is parallel to CD . Given that $\hat{GDH} = 38^\circ$ and $\hat{DHI} = 117^\circ$, calculate
 (a) \hat{BFG} ,
 (b) \hat{AFE} ,
 (c) \hat{FBG} .



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]

Suite 201/4/14 Gardeners Pt

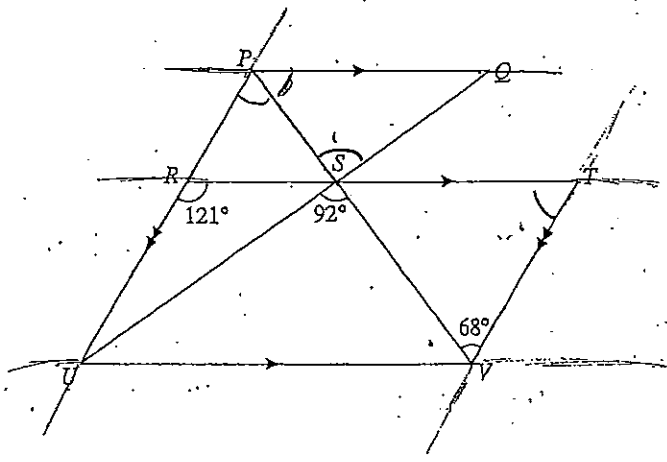
6 In the diagram AB is parallel to CD . Find the value of x .



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

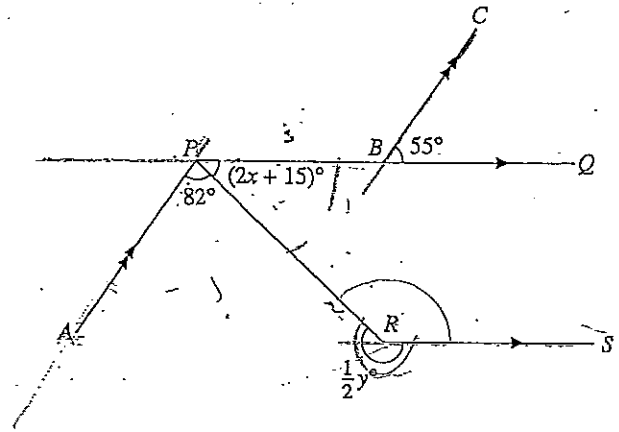
- (a) \widehat{PSQ} ,
- (b) \widehat{RPS} ,
- (c) \widehat{STV} ,
- (d) \widehat{SPQ} .



- 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]

CEM Tutor
 Tel: 9953 3331

- 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

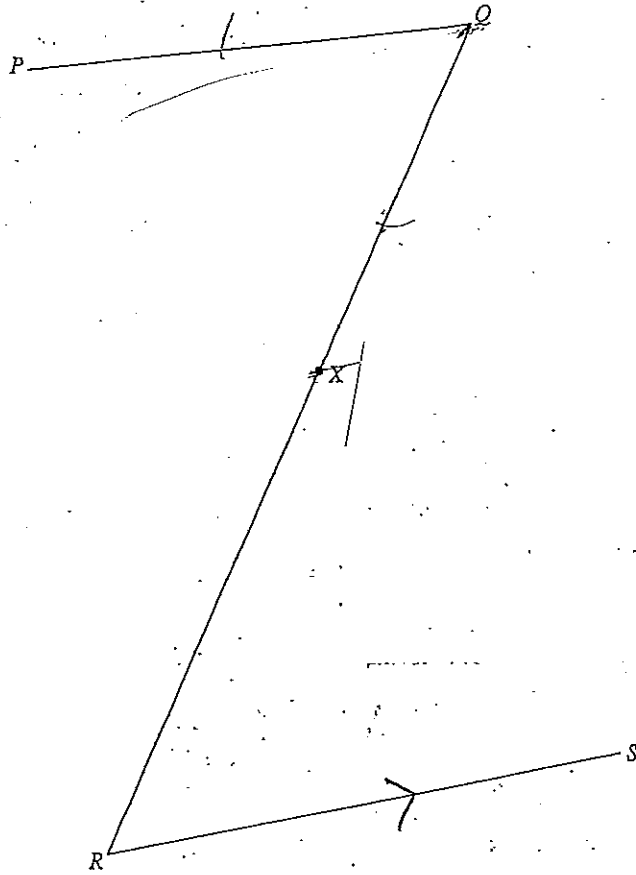


Answer $x = \dots\dots\dots$ [2]

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

- 9 (a) On the diagram, construct.
- (i) the angle bisector of \hat{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]



S.E.M. Tutor
Tel: 9668 3331

- 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]

INSTRUCTIONS TO CANDIDATES

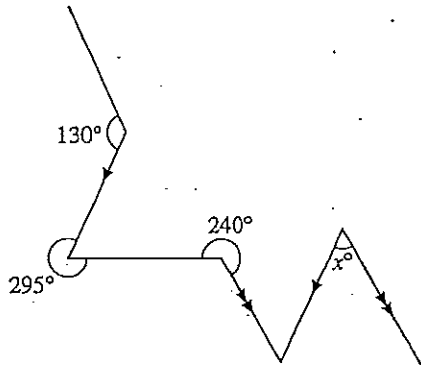
Section B (30 marks)

Time: 45 minutes

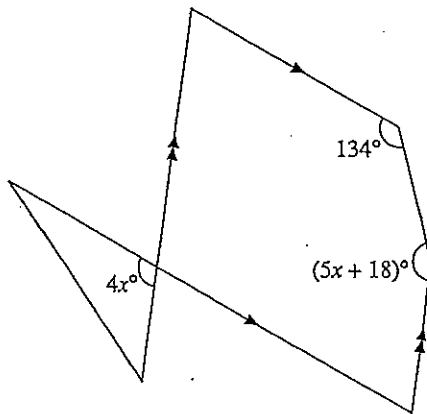
1. Answer all the questions in this section.
2. Calculators may be used in this section.
3. All working must be clearly shown. Omission of essential working will result in loss of marks.
4. The marks for each question is shown in brackets [] at the end of each question.

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

(a)



(b)

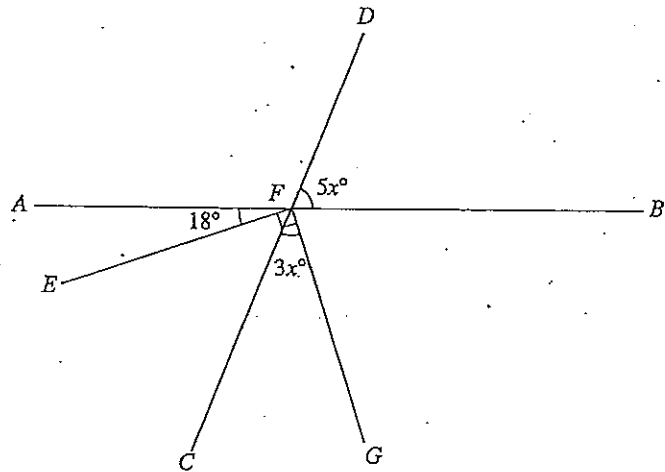


Answer (a) $x = \dots\dots\dots$ [4]

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

C.E.M. TUNTON
TEL: 0966 3331

- 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} .



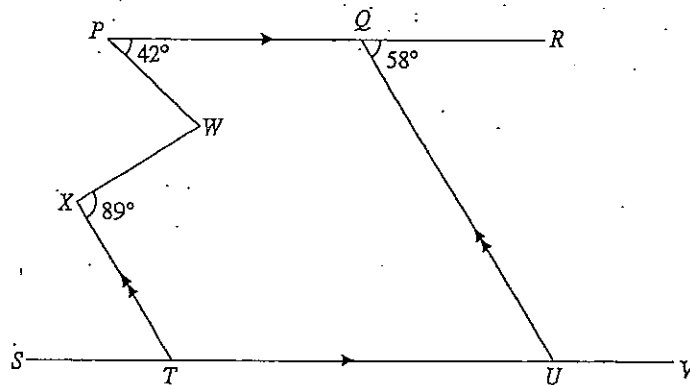
Answer (a) $x = \dots\dots\dots$ [3]

(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} .

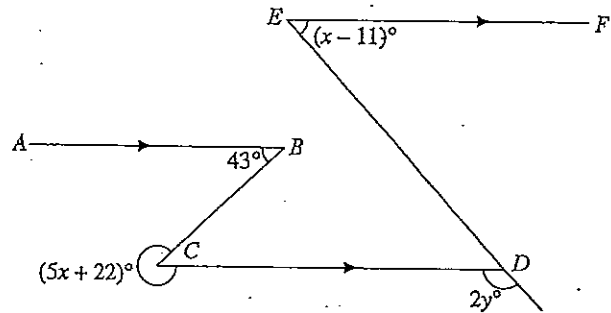


Answer (a) $\widehat{QUT} = \dots\dots\dots^\circ$ [1]

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

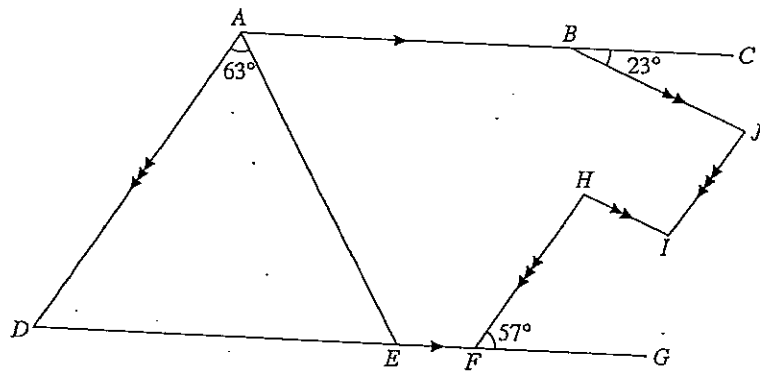
(c) reflex $\widehat{PWX} = \dots\dots\dots^\circ$ [3]

- 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]

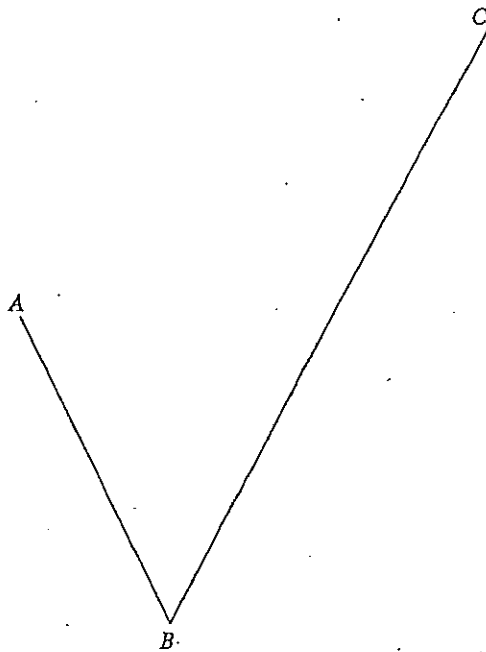
(b) (i) $\hat{EAB} = \dots\dots\dots^\circ$ [2]

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

- 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]

C.E.M. Tutor
Tel: 0855 2921

14. (a)

Teacher's Tip

To calculate the percentage discount, find the amount 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

$$\begin{aligned} &= \$6800 + (60 \times \$1433.50) \\ &= \$6800 + \$86\,010 \\ &= \$92\,810. \end{aligned}$$

$$\begin{aligned} 60 \text{ yrs} &= 5 \times 10 \\ &= 50 \text{ months} \end{aligned}$$

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

(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.

Total basic salary in 2003
 $= 103.2\%$ of \$69 000

$$\begin{aligned} &= \frac{103.2}{100} \times \$69\,000 \\ &= \$71\,208 \end{aligned}$$

(ii) Bonus received in 2003

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

0.85% — \$7276

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

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

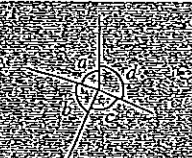
Test 13: Basic Geometrical Concepts and Properties

Section A

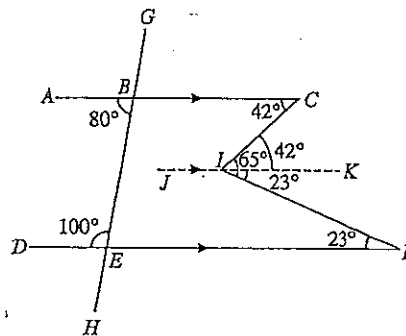
1. $90^\circ + (3x^\circ + 25^\circ) + 23^\circ + 7x^\circ + 42^\circ = 360^\circ$ (\angle s at a point)
 $10x^\circ + 180^\circ = 360^\circ$
 $10x^\circ = 180^\circ$
 $x^\circ = \frac{180^\circ}{10}$
 $x^\circ = 18^\circ$
 $\therefore x = 18$

Teacher's Tip

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



2.



(a) Draw the line JK parallel to AC .

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

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

$$= 23^\circ$$

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

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

Teacher's Tip

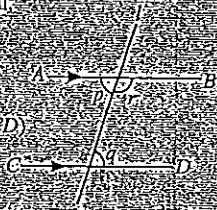
When we have two parallel lines cut by a transversal l

(a) the alternate angles are equal

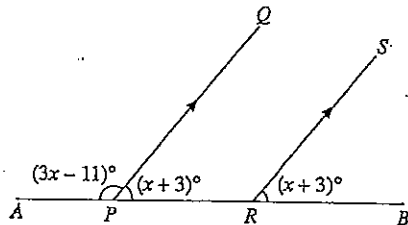
$$p = q \text{ (alt. } \angle\text{s, } AB \parallel CD)$$

(b) the interior angles are supplementary

$$p + r = 180^\circ \text{ (int. } \angle\text{s, } AB \parallel CD)$$



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

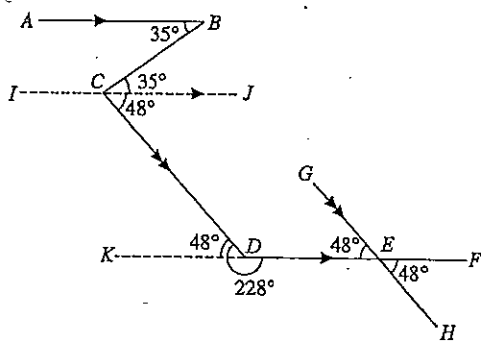
$$p = q \text{ (corr. } \angle\text{s, } AB \parallel CD)$$

2) The sum of adjacent angles on a straight line is equal to 180°

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



4.



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

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

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

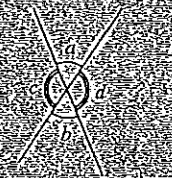
- (b) $\widehat{GED} = 48^\circ$ (corr. \angle s, $CD \parallel GH$)
 $\widehat{FEH} = 48^\circ$ (vert. opp. \angle s)

Teacher's Tip

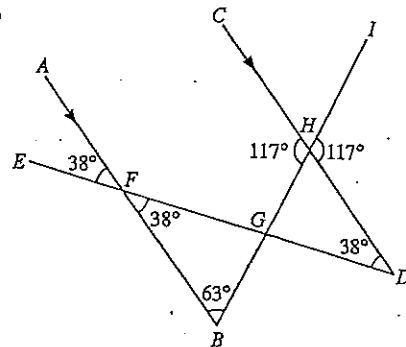
Vertically opposite angles are equal

$$a = b$$

$$c = d \text{ (vert. opp. } \angle\text{s)}$$

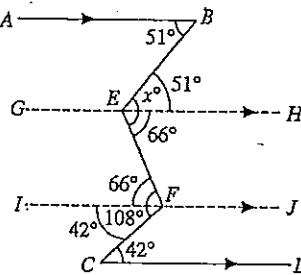


5. (a)



- (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, $PQ \parallel RS$)

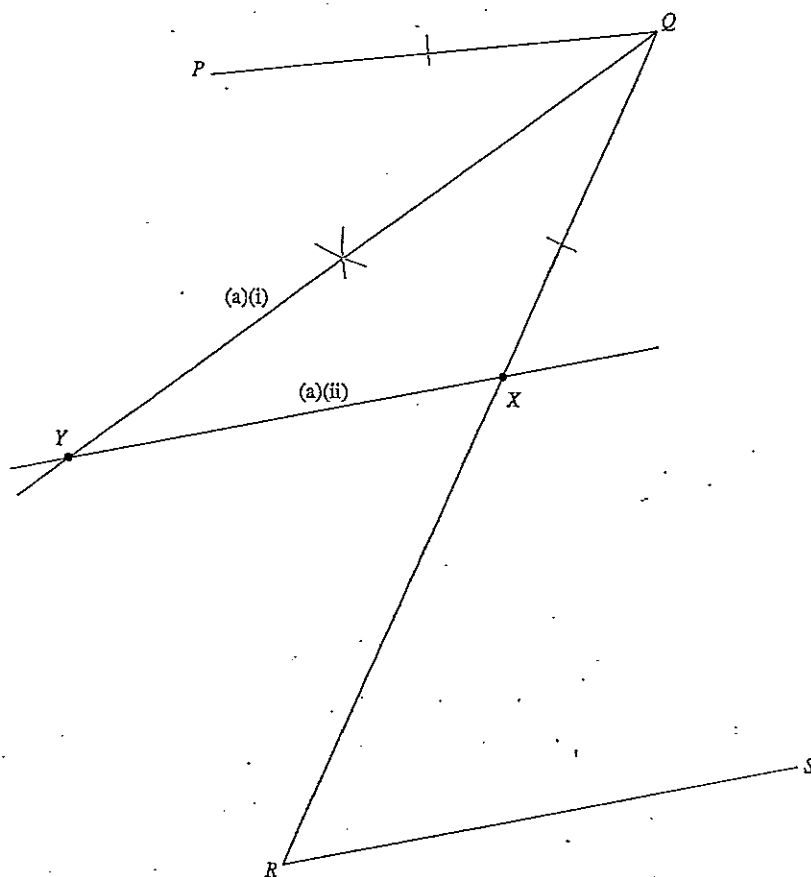
$= 137^\circ$

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

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

$y = 223 \times 2 = 446$

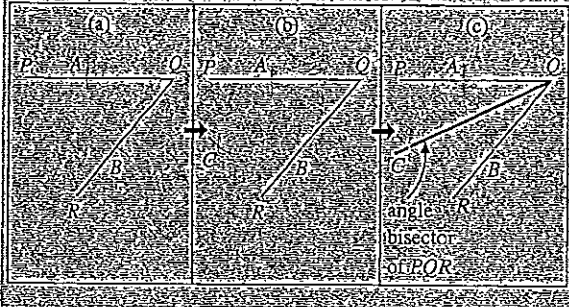
9.



Teacher's Tip

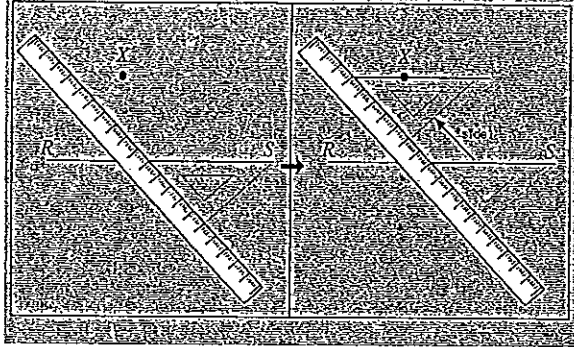
1. To construct the angle bisector of $\angle POR$:

- Use a pair of compasses and with O as centre, mark an arc to cut PO at A and an arc to cut OR at B .
- Using the same radius, with A and B as centres, draw two arcs to intersect at C .
- Draw a straight line from O through C .
 OC is the angle bisector of $\angle POR$.

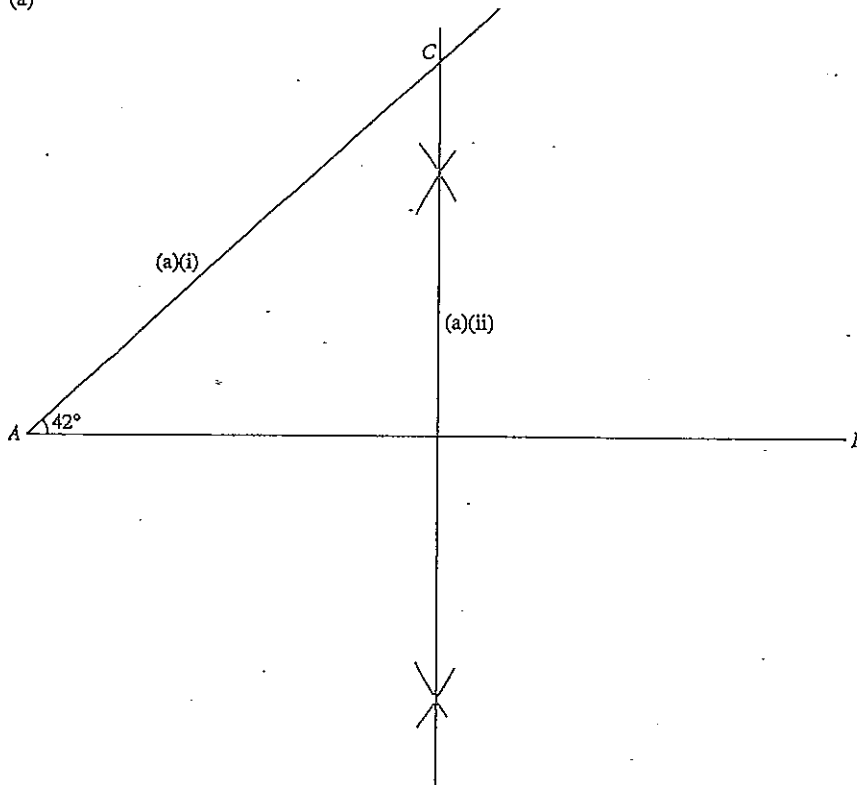


2. To draw a line through X which is parallel to RS :

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



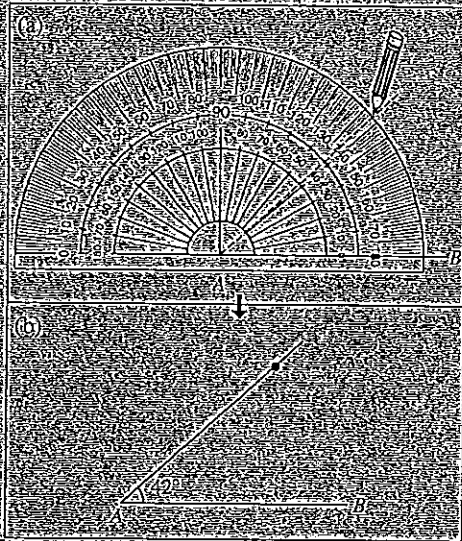
10. (a)



(b) $AC = 7.4$ cm

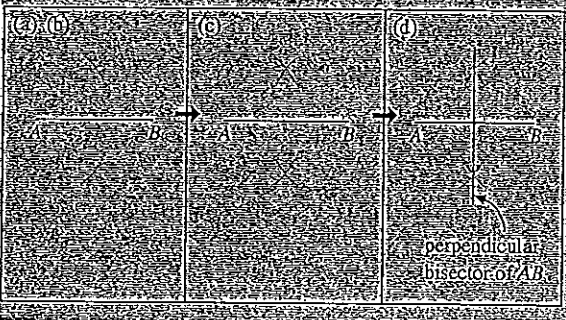
Teacher's Tip

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

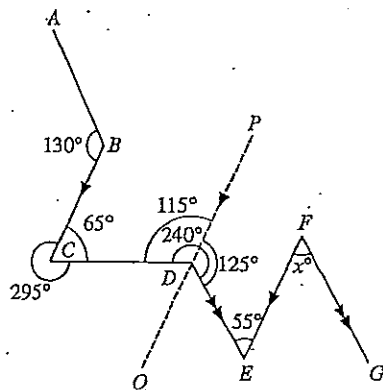


To construct the perpendicular bisector of AB

- 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.

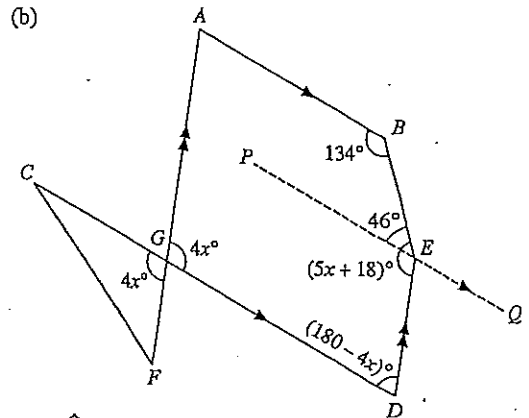


11. (a)



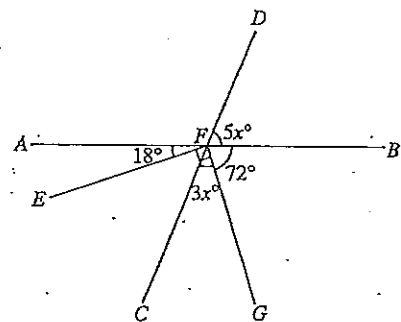
Draw line PQ through D parallel to BC and FE .

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



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

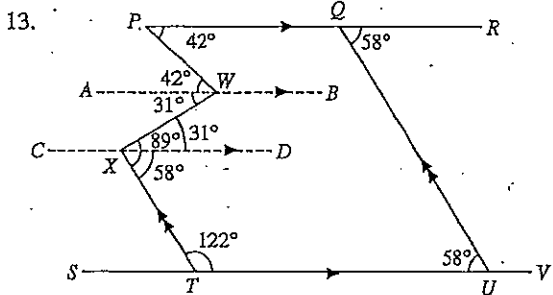
12. (a)



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

(b) $\widehat{EFC} = 90^\circ - 3(13.5^\circ)$
 $= 49.5^\circ$

(c) $\widehat{AFD} = 180^\circ - 5(13.5^\circ)$ (adj. \angle s on a str. line)
 $= 112.5^\circ$



(a) $\widehat{QUT} = 58^\circ$ (alt. \angle s, $PR \parallel SV$)

(b) $\widehat{UTX} = 180^\circ - 58^\circ$ (int. \angle s, $TX \parallel UQ$)
 $= 122^\circ$

(c) At the points W and X, draw two lines parallel to PR as shown.

$\widehat{TXD} = 180^\circ - 122^\circ$ (int. \angle s, $CD \parallel SV$)
 $= 58^\circ$

$\widehat{WXD} = 89^\circ - 58^\circ$
 $= 31^\circ$

$\widehat{AWX} = 31^\circ$ (alt. \angle s, $AB \parallel CD$)

$\widehat{PWA} = 42^\circ$ (alt. \angle s, $PR \parallel AB$)

Reflex $\widehat{PWX} = 360^\circ - 42^\circ - 31^\circ$ (\angle s at a pt.)
 $= 287^\circ$

14. (a) $\widehat{BCD} = 43^\circ$ (alt. \angle s, $AB \parallel CD$)

$(5x^\circ + 22^\circ) + 43^\circ = 360^\circ$ (\angle s at a pt.)

$5x = 360 - 43 - 22$
 $= 295$

$x = \frac{295}{5} = 59$

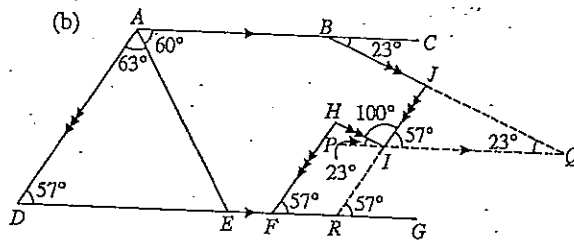
$\widehat{DEF} = (x - 11)^\circ$
 $= 59^\circ - 11^\circ$
 $= 48^\circ$

$\widehat{CDE} = 48^\circ$ (alt. \angle s, $CD \parallel EF$)

$2y^\circ = 180^\circ - 48^\circ$ (adj. \angle s on a str. line)

$2y = 132$

$y = \frac{132}{2}$
 $= 66$



(i) $\widehat{ADE} = 57^\circ$ (corr. \angle s, $AD \parallel HF$)

$\widehat{DAB} = 180^\circ - 57^\circ$ (int. \angle s, $AC \parallel DG$)
 $= 123^\circ$

$\widehat{EAB} = 123^\circ - 63^\circ$
 $= 60^\circ$

(ii) Draw line PQ through I parallel to AC.

Produce BJ to Q and JI to R.

$\widehat{JQI} = 23^\circ$ (alt. \angle s, $BC \parallel IQ$)

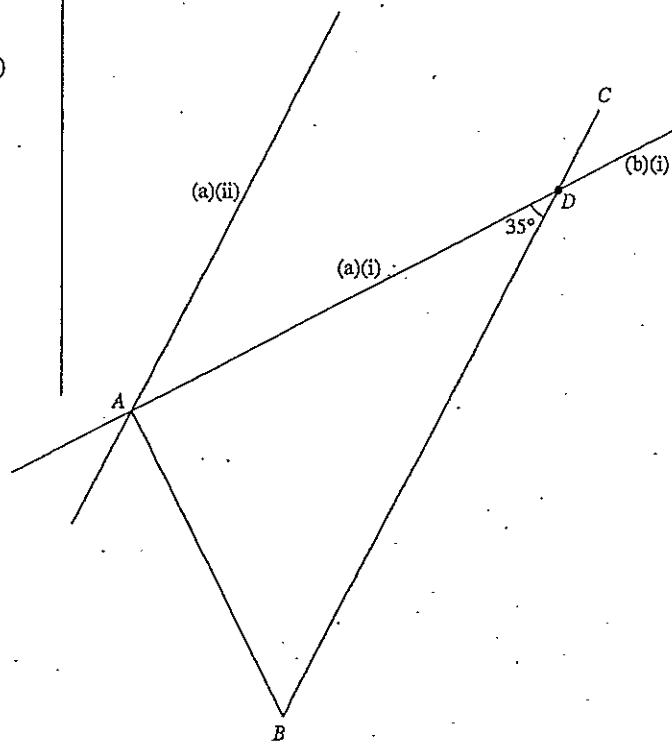
$\widehat{HIP} = 23^\circ$ (corr. \angle s, $HI \parallel JQ$)

$\widehat{IRG} = 57^\circ$ (corr. \angle s, $HF \parallel IR$)

$\widehat{JIQ} = 57^\circ$ (corr. \angle s, $IQ \parallel RG$)

$\widehat{HIJ} = 180^\circ - 23^\circ - 57^\circ$ (adj. \angle s on a str. line)
 $= 100^\circ$

15. (a), (b)



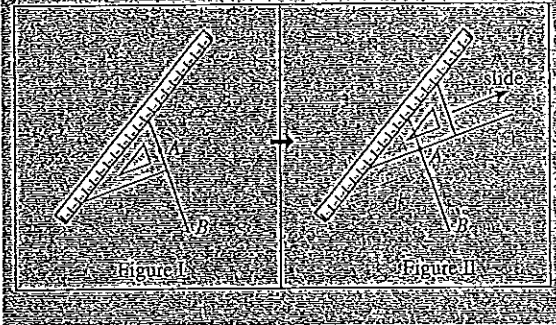
(b) (ii) $BD = 7.85$ cm

$\widehat{ADB} = 35^\circ$

Teacher's Tip

To construct a line perpendicular to AB passing through A :

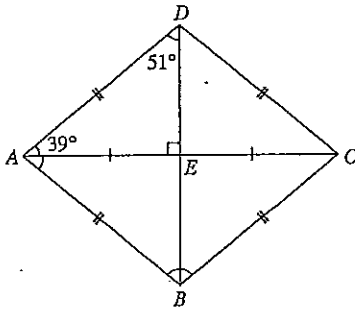
- (a) Place set square on line AB and ruler as shown in Figure I.
- (b) Slide set square along the length of the ruler until the edge of the set square passes through A as shown in Figure II. Draw the line passing through A and perpendicular to AB .



Test 14: Angle Properties of Triangles and Quadrilaterals

Section A

1.

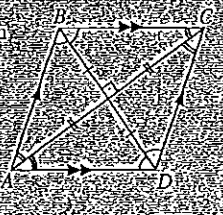


(a) $\hat{BAE} = \hat{DAE}$
 $= 180^\circ - 51^\circ - 90^\circ$
 $= 39^\circ$

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

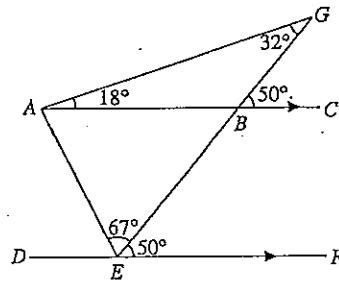
1. A rhombus is a parallelogram with all sides equal in length.
2. The diagonals bisect each other at right angles.
3. Opposite angles are equal.
4. The diagonals bisect the angles.



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

Opposite angles are equal.

2.

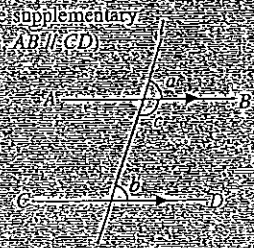


- (a) $\hat{BEF} = 50^\circ$ (corr. \angle s, $AC \parallel DF$)
- (b) $\hat{AGB} + 18^\circ = 50^\circ$ (ext $\angle =$ sum of int. opp. \angle s)
 $\hat{AGB} = 50^\circ - 18^\circ = 32^\circ$
- (c) $\hat{EAB} + \hat{AEF} = 180^\circ$ (int. \angle s, $AC \parallel DF$)
 $\hat{EAB} + 67^\circ + 50^\circ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

Teacher's Tip

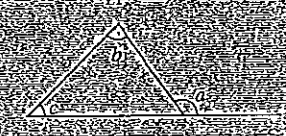
When two parallel lines are cut by a transversal:

- (a) the corresponding angles are equal.
 $a = b$ (corr. \angle s, $AB \parallel CD$)
- (b) the interior angles are supplementary.
 $b + c = 180^\circ$ (int. \angle s, $AB \parallel CD$)

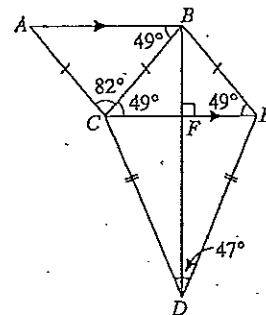


2. The exterior angle of a triangle is equal to the sum of the interior opposite angles.

$a = b + c$ (ext. $\angle =$ sum of int. opp. \angle s)



3.



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