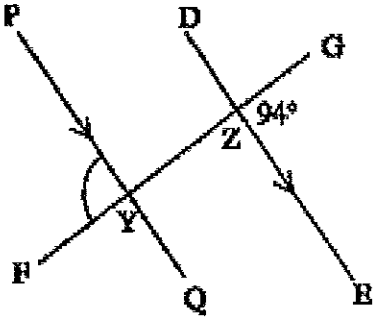
SHEET 2. DEDUCTIVE GEOMETRY

Numerical examples

Complete these proofs, putting in the reasons and missing angle sizes. Find the angles and mark them on the diagram as you go.

1. Find the size of ∠PYF



∠GZE = ∠DZY (.....

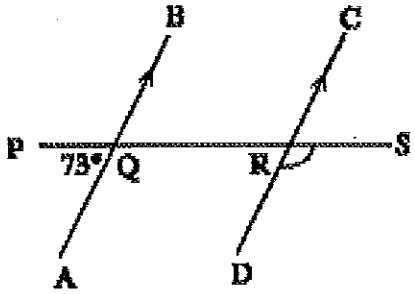
.....)

∠DZY = ∠PYF (.....

.....)

∴ ∠PYF = _____°

2. Find the size of ∠SRD



∠PQA + ∠RQA = 180°

(.....)

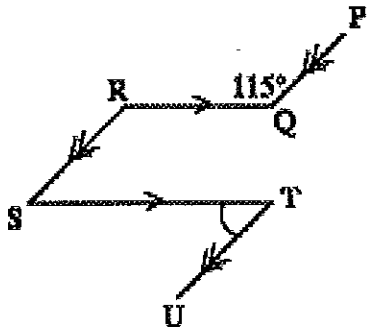
∴ ∠RQA = _____°

∠RQA = ∠SRD (.....

.....)

∴ ∠SRD = _____°

3. Find the size of ∠STU



∠PQR = ∠QRS = 115°

(.....)

∠RST + ∠SRQ = 180°

(.....)

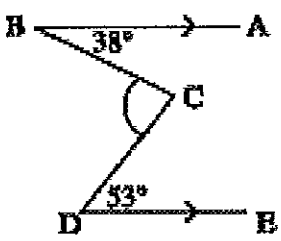
∴∠RST = _____°

∠RST = ∠STU

(.....)

∴∠STU = _____°

4. Find the size of ∠BCD



Construct a line PC parallel to BA

∠ABC = ∠BCP

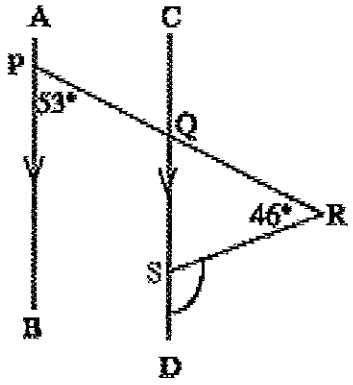
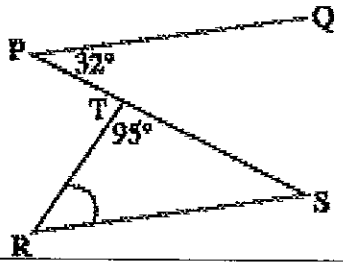
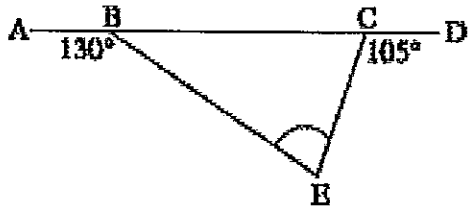
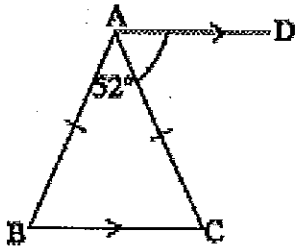
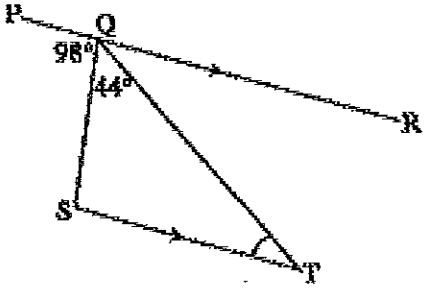
(.....)

∠EDC = ∠PCD

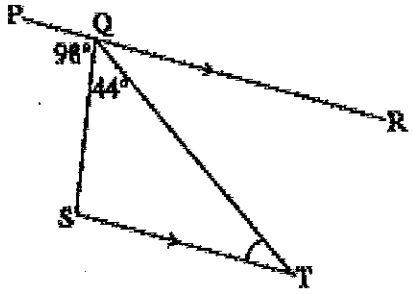
(.....)

But ∠BCD = ∠BCP + ∠DCP

∴∠BCD = _____

5. Find the size of ∠ DSR  	∠BPQ = ∠SQR = 53° (.....) ∠DSR = ∠SQR + ∠R (.....) ∴∠DSR = _____°
6. Find the size of ∠R  	∠QPS = ∠S (.....) ∠R + ∠S + ∠RTS = 180° (.....) ∴ ∠R = (180 − 95 − 32)° ∴ ∠R = _____°
7. Find the size of ∠E  	∠ABC + ∠CBE = 180° (.....) ∴ ∠CBE = _____° Similarly ∠BCE = 75° ∠E + ∠EBC + ∠BCE = 180° (.....) ∴ ∠E = _____°
8. Find the size of ∠DAC. Note that ΔABC is isosceles  	∠B = ∠C (.....) ∠BAC + ∠B + ∠C = 180° (.....) ∴∠C = (180 − 52) ÷ 2 = _____° ∠C = ∠DAC (.....) ∴∠DAC = _____°
9. Find the size of ∠DBA.  	∠A + (∠ABE + ∠EBC) + ∠C = 180° (.....) ∴ 44° + ∠ABE + 32° + 38° = 180° ∴ ∠ABE = _____° ∠ABE + ∠DBA = 180° (.....) ∴∠DBA = _____°

10. Find the size of $\angle T$



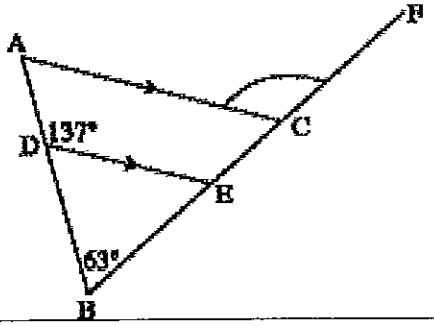
$\angle PQS + \angle SQT + \angle TQR = 180^o$
(.....)

$\therefore \angle TQR =$ _____ ^{o}

$\angle TQR = \angle T$
(.....)

$\therefore \angle T =$ _____ ^{o}

11. Find the size of $\angle FCA$



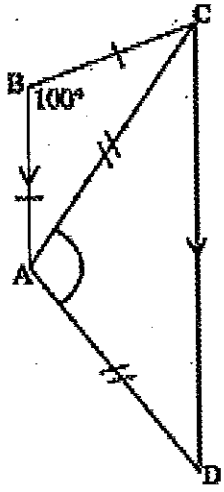
$\angle ADE + \angle A = 180^o$
(.....)

$\therefore \angle A =$ _____ ^{o}

$\angle FCA = \angle A + \angle B$
(.....)

$\therefore \angle FCA =$ _____ ^{o}

12. Find the size of $\angle CAD$



Note that triangles ABC and ACD are isosceles and that BA is parallel to CD.

$\angle B + \angle BAC + \angle BCA = 180^o$
(.....)

$\angle BAC = \angle BCA$
(.....)

$\therefore \angle BAC =$ _____ ^{o}

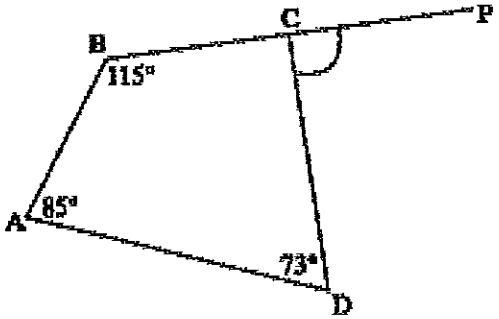
$\angle BAC = \angle ACD = 40^o$
(.....)

$\angle ACD = \angle D = 40^o$
(.....)

$\angle D + \angle DAC + \angle ACD = 180^o$
(.....)

$\therefore \angle CAD =$ _____ ^{o}

13. Find the size of $\angle PCD$



$\angle A + \angle B + \angle BCD + \angle D = 360^o$

(.....)

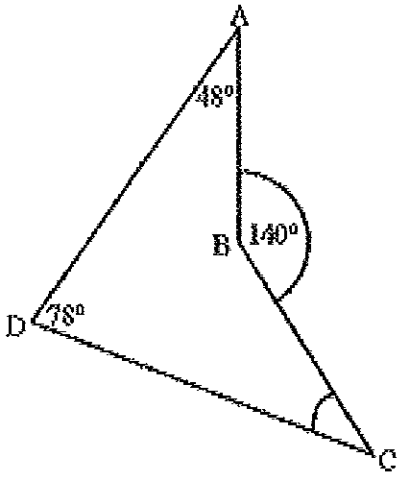
$\therefore \angle BCD =$ _____ ^{o}

$\angle BCD + \angle PCD = 180^o$

(.....)

$\therefore \angle PCD =$ _____ ^{o}

14. Find the size of ∠C



Reflex ∠B = _____ ^{o}

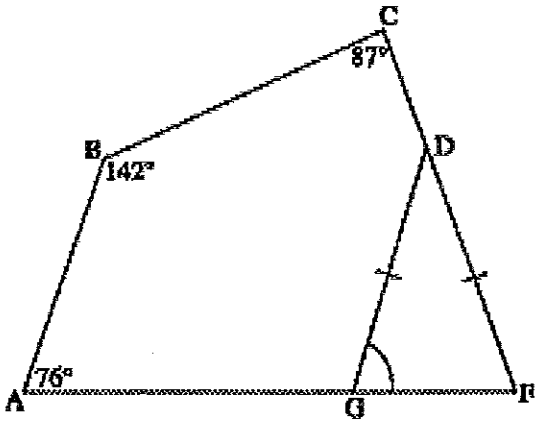
(.....)

(Reflex ∠B) + ∠D + ∠A + ∠C = 360^{o}

(.....)

∴ ∠C = _____ ^{o}.

15. Find the size of ∠DGF



∠A + ∠B + ∠C + ∠F = 360^{o}

(.....)

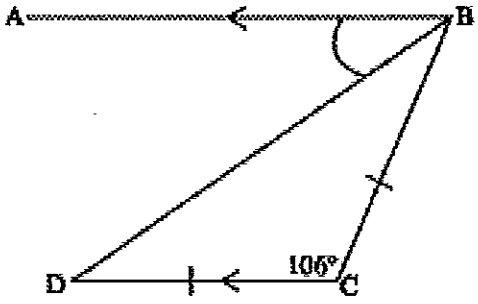
∴ ∠F = _____ ^{o}

∠F = ∠DGF

(.....)

∴ ∠DGF = _____ ^{o}

16. Find the size of ∠ABD



∠ABC + ∠BCD = 180^{o}

(.....)

∴∠ABC = _____ ^{o} ----------[1]

∠D + ∠C + ∠DBC = 180^{o}

(.....)

∠D = ∠DBC

(.....)

∴∠DBC = _____ ^{o} ----------[2]

∠ABD = ∠ABC − ∠DBC (see diagram)

Using [1] and [2]

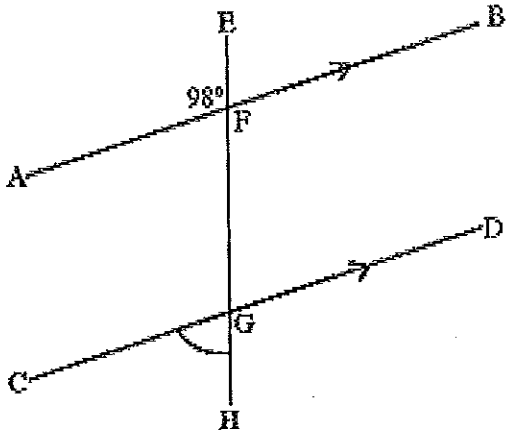
∠ABD = _____ ^{o}

SHEET 3. DEDUCTIVE GEOMETRY

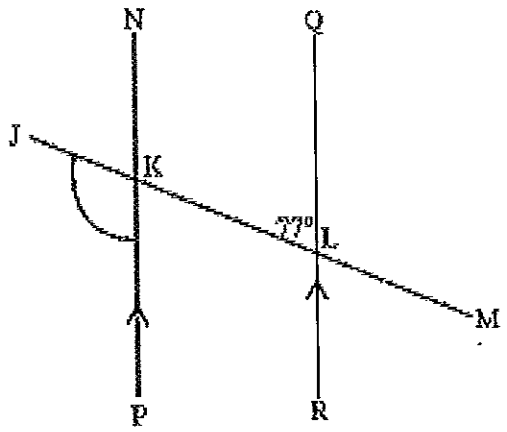
Numerical examples, free response

For each of the following examples, find the size of the angle required and give a full proof of your answer.

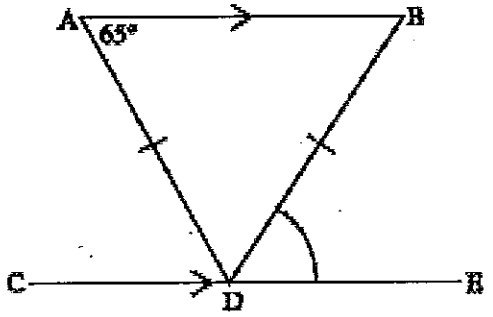
1. Prove that $\angle CGH = 82^\circ$



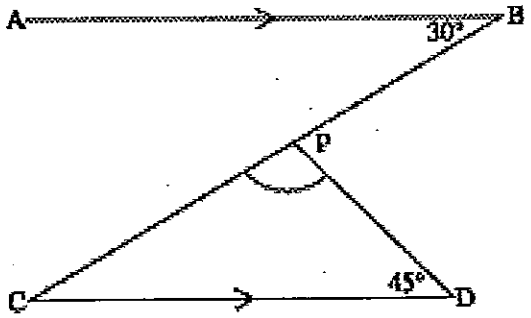
2. Find the size of $\angle JKP$, proving your answer



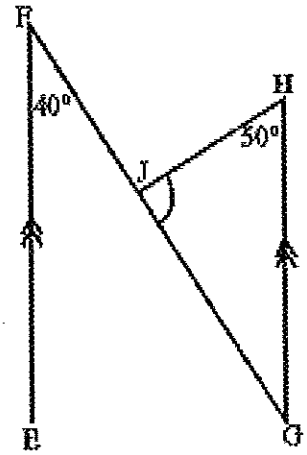
3. Find the size of $\angle BDE$ (note that ΔABD is isosceles and AB || CE)



4. Find the size of $\angle CPD$, giving proof of your answer



5. Prove that $\angle GJH$ is a right angle



6. Prove that $\angle DFG = 66^\circ$