YEAR 9
ADVANCED MATHEMATICS

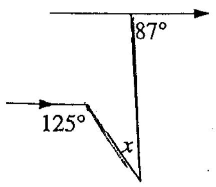
Geometry

Time Allowed:	45 minutes
Examiner:	Ms Opferkuch
Instructions:	All questions may be attempted.
	All necessary working should be shown in every question. Marks may be deducted for careless or badly arranged work.

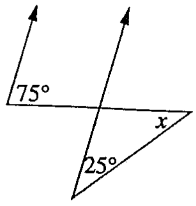
Name:

1. Find the value of x.

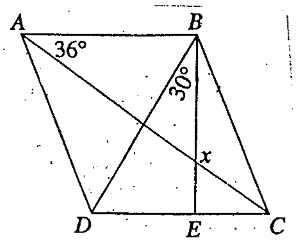
(a)



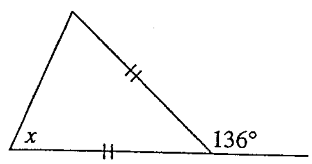
(b)



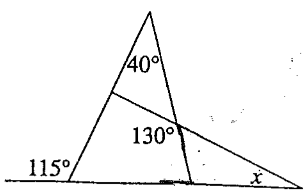
2. ABCD is a rhombus.
Find the value of x.



3. Find the value of x, giving reasons.



4. Find the value of x.

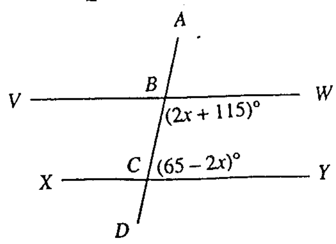


5. ABCD is a quadrilateral with AD extended to E.

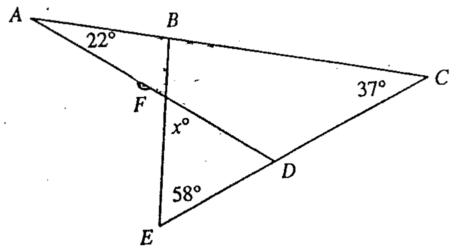
If $\angle ABC = \angle CDE$.

Prove that $\angle BAD + \angle BCD = 180°$

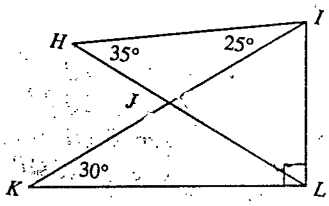
6. Prove $VW \parallel XY$.



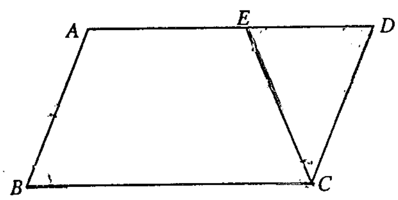
7. Evaluate x, giving reasons.



8. Prove that
ΔJKI is equilateral and ΔJKL isosceles.



9. $ABCD$ is a parallelogram with
$DE = DC$.
Prove that CE bisects $\angle BCD$.



10. Find the sum of the interior angles of a regular polygon whose exterior angles are 18^0.

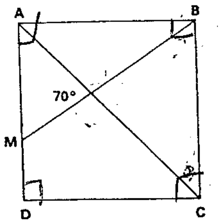
11. Bisect an interval AB. *Refer to figure 1.*

(a) What type of quadrilateral is AYBX?

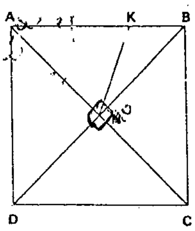
(b) What property justifies the accuracy of this construction method?

12. What geometric property is required for regular polygons to tesselate?

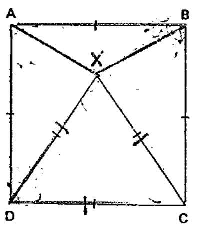
13.*(a)* In the square ABCD as shown <ALM is 70°.
Find <LBC and give reasons.



13*(b)* ABCD is a square with the diagonals meeting at N.
On the line AB, a point K is taken so that AK=AN.
Find with reasons the size of <AKN and <KNB.

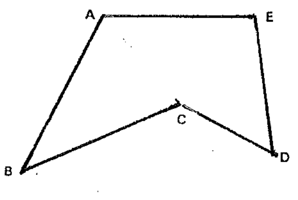


14. ABCD is a square and <CDX is an equilateral triangle as shown.
Find <AXB and <AXC in degrees.



15 The figure ABCDE, as shown, is what is sometimes called a ……. pentagon.

By forming triangles show that the sum of the interior angles is still the same as calculated for the conventional pentagon.

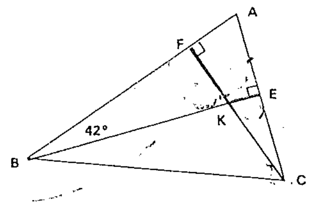


16. Suppose <ABE = x.

(a) Find <BAC and <BKF in terms of x.

(b) Find <BKF in terms of x.

(c) What is <BAC + < BKC?



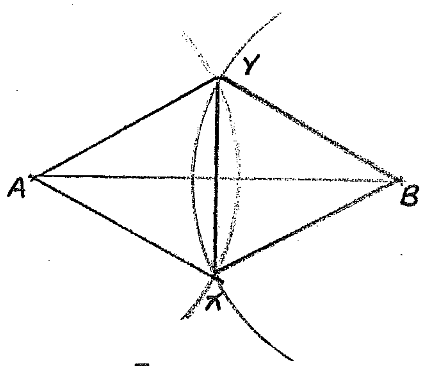


FIGURE 1

1) a) $\angle BGF = 87°$ (alternate $\angle$)

$\angle EGF = 180 - 125$
$= 55°$ (cointerior

$\therefore x° = 87° - 55°$
$x° = 32°$

b) $\angle CBD = 180° - 75°$
$= 105°$ (cointerior $\angle$'s)

$\angle FDE = 105°$ (vertically opp)

$\therefore x° = (105 + 25) - 180$
$x° = 50°$

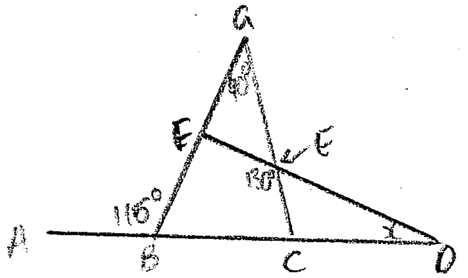
2) $\angle BFA = 90° + 30° - 180°$
$= 60°$

$\therefore x° = 180° - 60°$ ($\angle$ sum straight $\angle$)
$x° = 120°$

3) $\frac{136°}{2} = \frac{2x}{2}$ (exterior $\angle$ is sum of 2 interior $\angle$'s)

$x° = 68°$

4)



$\angle GBC = 180° - 115°$ ($\angle$ sum straight line)
$= 65°$

$\angle FEG = 180 - 130$ ($\angle$ sum straight line)
$= 50°$

$\angle GFE = 180 - 50 - 40$
$= 90°$

$\angle EFB = 90°$ ($\angle$ sum straight line)

$\therefore x° = 180° - 90° - 65°$ ($\angle$ sum straight line)
$x° = 25°$

6) $2x° + 115° + 65° - 2x°$
$= 115 + 65$
$= 180°$

$\therefore VW // XY$ (cointerior $\angle$'s are supplementary)

7) $\angle CBE = (37° + 58°) - 180°$
$= 85°$ ($\angle$ sum of Δ)

$\angle ABF = 180 - 85$ ($\angle$ sum straight line)
$= 95°$

$\angle BFA = 180 - 95 - 22$
$= 63°$

$\therefore x = 63°$ (vertically opposite)

) $\angle HJL = 180° - 35 - 25$
$= 120°$

$\angle KJL = 120°$ (vertically opposite)

$\angle JLK = 180 - 30 - 120$ ($\angle$ sum Δ)
$= 30°$

$\therefore \Delta JKL$ is an isosceles Δ (base $\angle$' of isos Δ are equal)

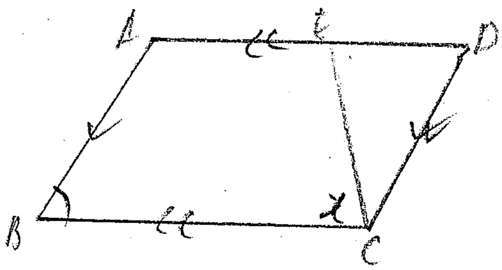
$\angle ILJ = 90 - 30$
$= 60°$

$\angle IJL = 180 - 120$
$= 60°$

$\angle JIL = 180 - 60 - 60$
$= 60°$

$\therefore \Delta IJL$ is equilateral Δ (all $\angle$'s are equal.

9) $AD \parallel BC$ & $AB \parallel DC$



$\angle DEC = x°$ (alternate $\angle$'s)

$\angle DCE = x°$ (base of isos Δ)

$\therefore CE$ bisects $\angle BCD$

10) $360 \div 18$
$= 20$

$(n-2) \times 180°$

$(20-2) \times 180°$

$18 \times 180°$

$= 3240° \div 20$

$= 162°$ for one interior $\angle$ in 20 sided polygon.

1) a) Rhombus ✓

b) All sides are equal ✓

(12) Sides must all be equal ✓

(13) a) $\angle LBC = \cancel{45°}$ 65° (~~[illegible]~~) ($\angle$ sum of Δ)

b) $\angle ANK = 67.5$ ($\angle$ base of isos)

$\angle AKN = 67.5$ ($\angle$ base of isos)

$\therefore \angle BKN = 180 - 67.5$

$\angle BKN = 112.5$

$\therefore \angle KNB = 180° - 112.5° - 45°$

$\angle KNB = 22.5°$

(15) a) "irregular" ✓

$180 + 180 + 180 = \underline{540°}$

$(5-2) \times 180$ ✓

$= \underline{540°}$ ($\angle$ sum does not change)

b) $\angle BAC = 180 - x - 90$

$= 90 - x°$ ✓

$\angle BKF = 180 - 90 - x$

$= 90 - x°$ ✓

c) $\angle BKF = 180 - (90 - x)$

$= 90 + x$

$90 - x + 90 + x$ ✓ ($\angle BAC + \angle BKC$)

$= 180$ ~~[illegible]~~ ✓