Topic test 3 Geometrical figures

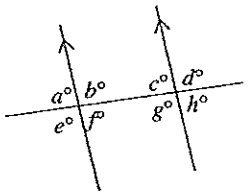
- Time allowed: 45 minutes.
- **Geometrical instruments required.**
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 13 free-response questions (60 marks)

Name: _____

Part A

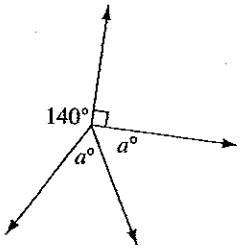
20 multiple-choice questions
2 marks each: 40 marks
Circle the correct answer.

1 One pair of corresponding angles in this diagram are:



A b and c
B c and d
C e and g
D f and g

2 $a =$

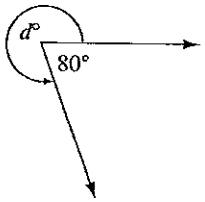


A 20
B 65
C 130
D 70

3 How many axes of symmetry has a parallelogram?

A 0 **B** 1
C 2 **D** 4

4 $d =$



A 100
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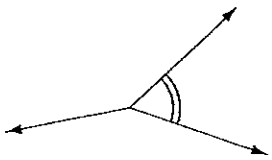
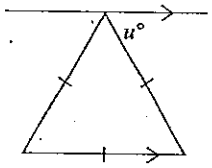
5 The marked angle is:



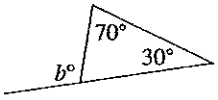
A alternate
B obtuse
C acute
D reflex

6 $u =$



A 120
B 45
C 60
D 30

7 $b =$

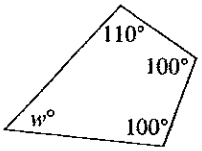


A 100 **B** 140
C 150 **D** 180

8 Which quadrilateral has exactly two axes of symmetry that are its diagonals?

A rhombus **B** kite
C trapezium **D** rectangle

9 $w =$



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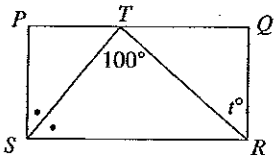
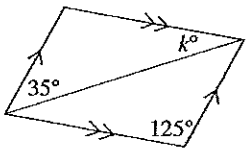


A 45
B 55
C 50
D 35

11 What are the sizes of the angles in an isosceles, right-angled triangle?

A 40°, 40°, 100° **B** 45°, 45°, 90°
C 90°, 90°, 20° **D** 60°, 60°, 90°

12 $k =$



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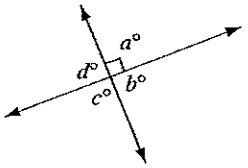
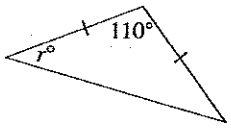
C 55
D 45

13 Which angles are equal in this diagram?



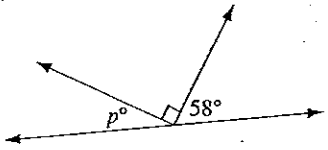
A a and c only
B a and d only
C a, c and d only
D all angles a, b, c, d

14 $r =$



A 70 **B** 55
C 35 **D** 30

15 $p =$



A 42
B 32
C 58
D 122

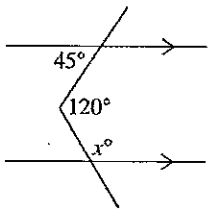
Topic test 3: Geometrical figures *continued*

16 Which one of these is **false** about a parallelogram?

A Opposite sides are parallel.
B Diagonals are equal.
C Opposite sides are equal.
D Opposite angles are equal.

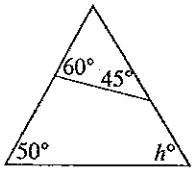
17 $x =$

A 165
B 75
C 105
D 135



18 $h =$

A 55
B 75
C 105
D 130

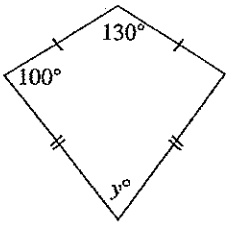


19 Which shape does **not** have rotational symmetry?

A rhombus
B parallelogram
C isosceles triangle
D equilateral triangle

20 $y =$

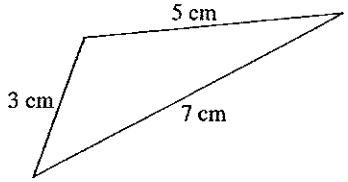
A 30
B 65
C 50
D 100



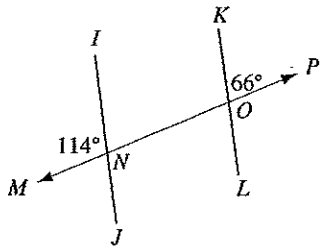
Part B

13 free-response questions
60 marks
Show working where appropriate.

21 (2 marks) Classify this triangle by sides and by angles.



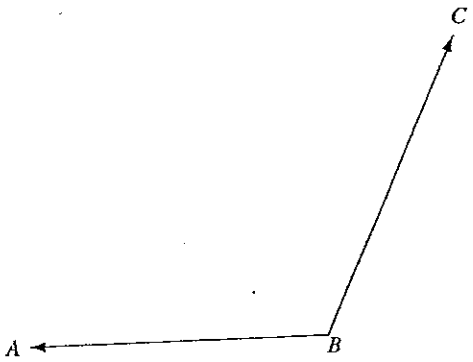
22 (4 marks) In the diagram, $\angle INM = 114°$ and $\angle KOP = 66°$.



a Find the size of $\angle INO$, giving reasons.

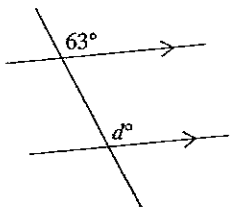
b Hence prove that IJ is parallel to KL, giving reasons.

23 (2 marks) Use a pair of compasses and a ruler to bisect $\angle ABC$.

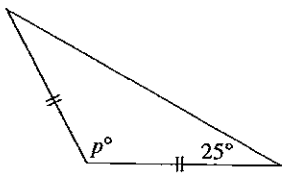


24 (12 marks) Find the value of each pronumeral.

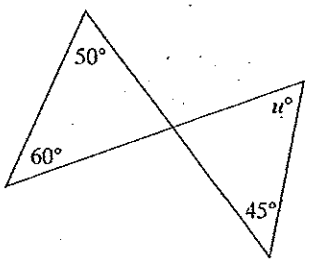
a



b

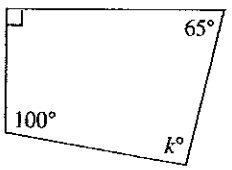


c

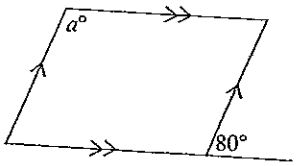


Topic test 3: Geometrical figures *continued*

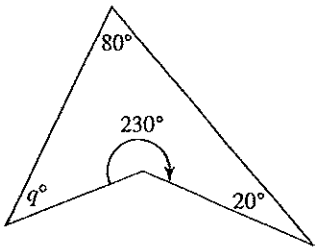
d



e

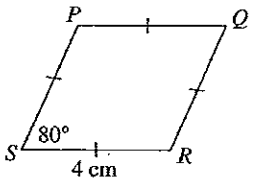


f

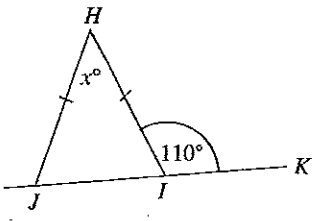


25 (2 marks) Sketch a right-angled triangle ΔPQR. Label its angles P, Q and R and correctly label its sides p, q and r.

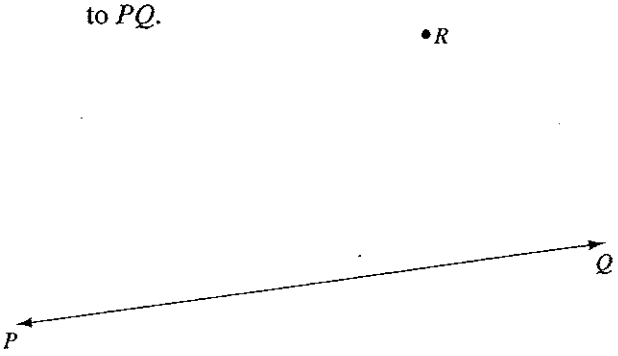
26 (4 marks) Construct this rhombus $PQRS$.



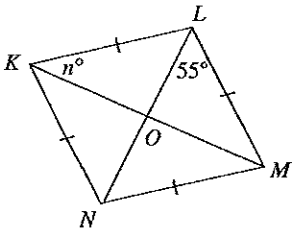
27 (2 marks) Find x, giving reasons.



28 (2 marks) Use a pair of compasses and a ruler to construct a line through R parallel to PQ.

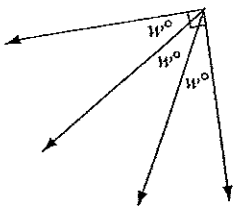


29 (2 marks) Find n, giving reasons.



30 (12 marks) Find the value of each pronumeral.

a



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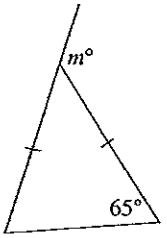

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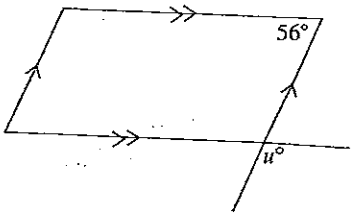

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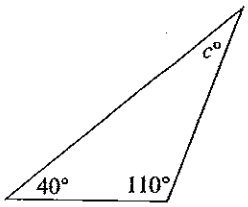

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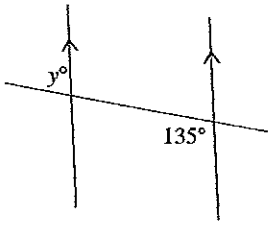

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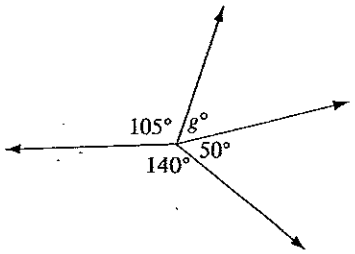


31 (3 marks) Construct a triangle ΔABC where $a = 4$ cm, $\angle C = 110°$ and $\angle B = 20°$.

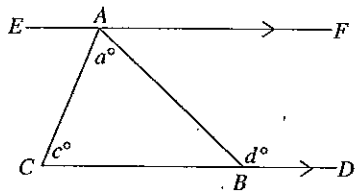
32 (6 marks)

a Explain in your own words what a rectangle is.

b Write one property about the sides of a rectangle.

c Write one property about the diagonals of a rectangle.

33 (7 marks) In the diagram, $EF \parallel CD$.



a Which angle in ΔABC is equal to $\angle EAC$? Why?

b Hence write an expression for the size of $\angle EAB$.

c What types of angles are $\angle EAB$ and $\angle ABD$?

d Hence write an expression for the value of d.

e What does this prove about the exterior angle of a triangle?

END OF TEST.

Use the rest of this column for extra working space.

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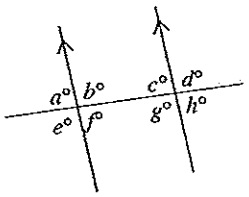

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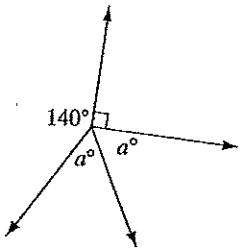

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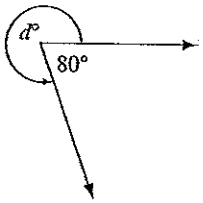

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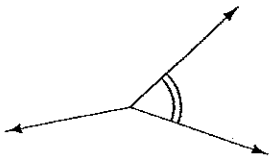

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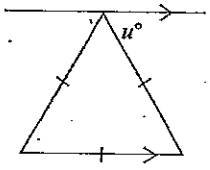

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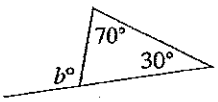

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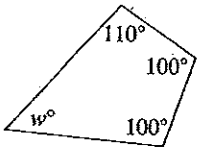

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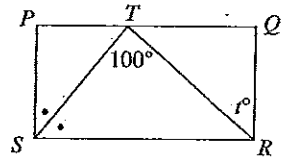

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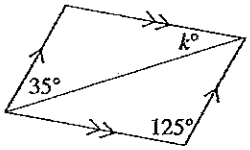

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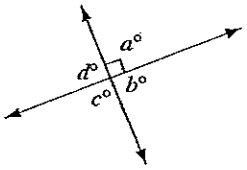

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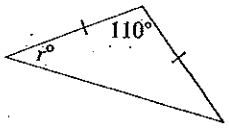

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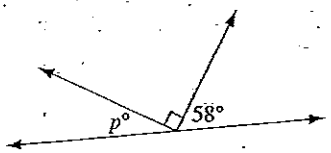

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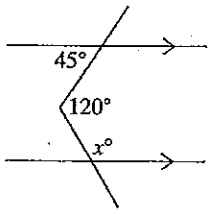

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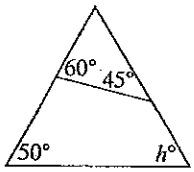
C 105
D 130

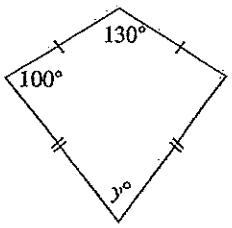


19 Which shape does **not** have rotational symmetry?

A rhombus
B parallelogram
C isosceles triangle
D equilateral triangle

20 $y =$

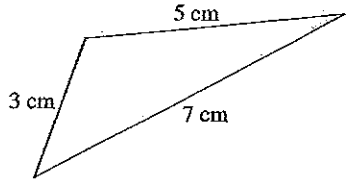
A 30
B 65
C 50
D 100



Part B

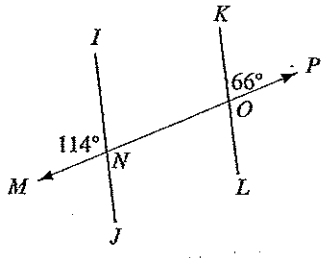
13 free-response questions
60 marks
Show working where appropriate.

21 (2 marks) Classify this triangle by sides and by angles.



SCALENE Δ

22 (4 marks) In the diagram, $\angle INM = 114°$ and $\angle KOP = 66°$.



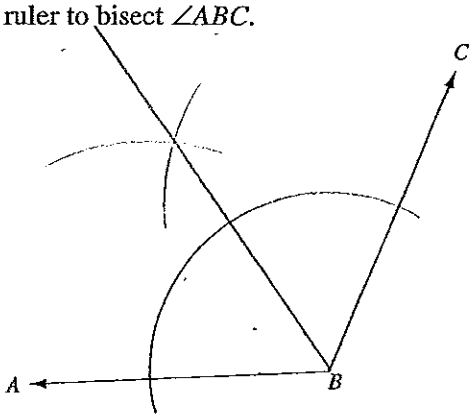
a Find the size of $\angle INO$, giving reasons.

$\angle INO = 66°$ (Straight line)

b Hence prove that IJ is parallel to KL, giving reasons.

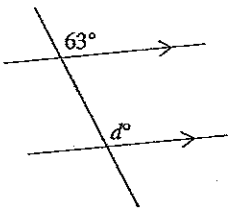
$\angle INO = \angle KOP = 66°$ (Corresponding ∠s are equal)

23 (2 marks) Use a pair of compasses and a ruler to bisect $\angle ABC$.



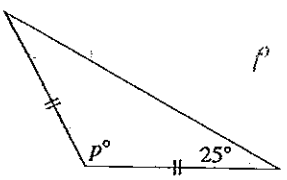
24 (12 marks) Find the value of each pronumeral.

a



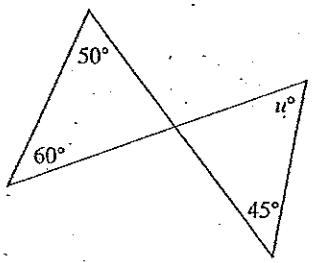
$d = 63$ (Corr ∠s)

b



$p = 130$

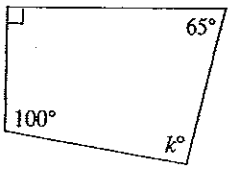
c



$u = 65$

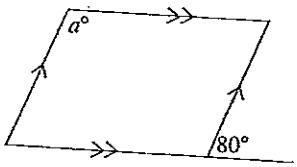
Topic test 3: Geometrical figures *continued*

d



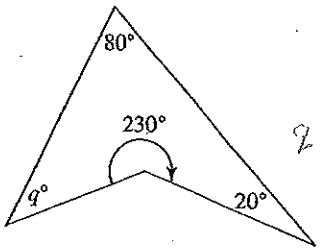
$k = 105$

e



$a = 100$

f



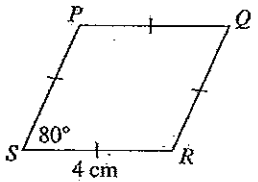
$q = 30$

25 (2 marks) Sketch a right-angled triangle ΔPQR. Label its angles P, Q and R and correctly label its sides p, q and r.

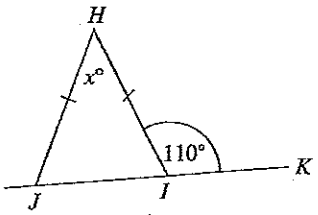
Tutor to check

26 (4 marks) Construct this rhombus $PQRS$.

Tutor to check

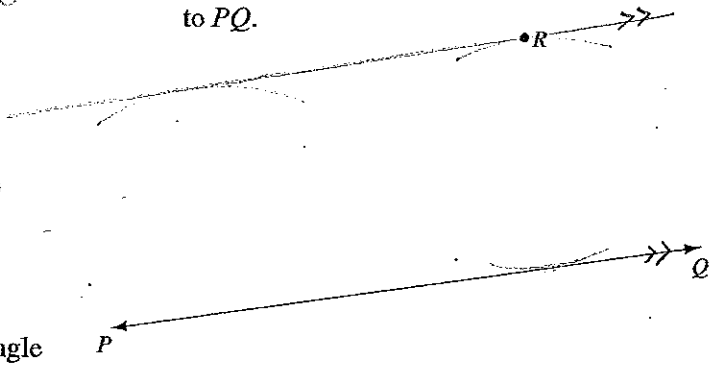


27 (2 marks) Find x, giving reasons.

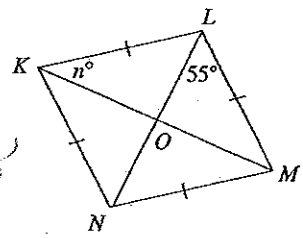


$x = 40$

28 (2 marks) Use a pair of compasses and a ruler to construct a line through R parallel to PQ.



29 (2 marks) Find n, giving reasons.



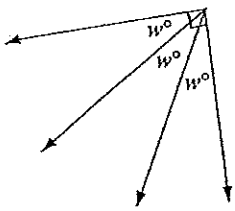
$\angle OLK = 55°$ (Diagonals bisect the vertex angles)

$n° = 180° - 55° - 90°$

$= 35°$

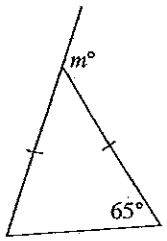
30 (12 marks) Find the value of each pronumeral.

a



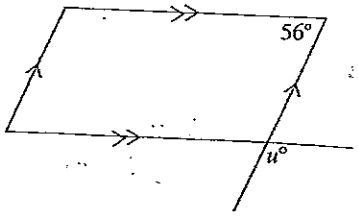
$u = 30$

b



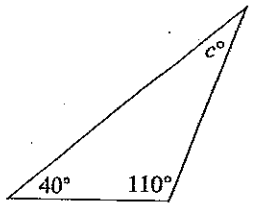
$m = 130$

c



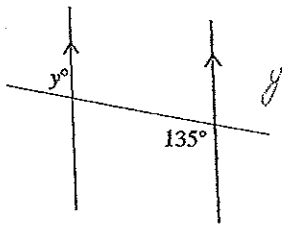
$u = 124$

d



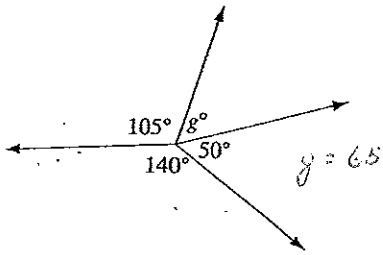
$c = 30$

e



$y = 45$

f



$y = 65$

31 (3 marks) Construct a triangle ΔABC where $a = 4$ cm, $\angle C = 110°$ and $\angle B = 20°$.

Tutor to check

32 (6 marks)

a Explain in your own words what a rectangle is.

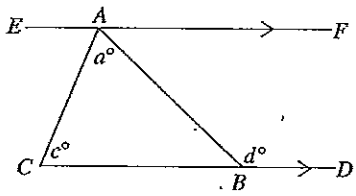
- Opp. sides equal & parallel
- Diagonals bisect one another
- Each vertex angle is 90°

b Write one property about the sides of a rectangle. opposite sides are equal

c Write one property about the diagonals of a rectangle.

diagonals bisect each other.

33 (7 marks) In the diagram, $EF \parallel CD$.



a Which angle in ΔABC is equal to $\angle EAC$? Why? $c°$ (Alternate $\angle$s $EF \parallel CD$)

b Hence write an expression for the size of $\angle EAB$. $a° = d° + c°$ (Ext. $\angle$ of $\triangle ABC$)

c What types of angles are $\angle EAB$ and $\angle ABD$?

Alternate $\angle$s.

d Hence write an expression for the value of d.

$d° = a° + c°$

e What does this prove about the exterior angle of a triangle?

Ext. $\angle$ of $\triangle$ is equal to the sum of the interior opp. $\angle$s.

END OF TEST.

Use the rest of this column for extra working space.