

INTERMEDIATE CERTIFICATE EXAMINATION, 1970

MATHEMATICS — LOWER COURSE — PAPER I
(150 marks)

WEDNESDAY, 10th JUNE — MORNING, 9.45 to 12.15

Six questions to be answered.
All questions are of equal value.

1. Find the total cost of the following items:

25 metres of rope at 7 new pence per metre.
1.25 kilogrammes of meat at 72 new pence per kilogramme.
0.25 litres of alcohol at £3 per litre.
4 pots of jam at 15 new pence per pot.

If $2\frac{1}{2}\%$ discount is allowed, find the total cost. (Take £1 = 100 new pence.)

2. Evaluate

(a) $\frac{28.7 \times 7.55}{14.35}$

(b) $6.2 \sqrt{\frac{l}{g}}$ where $l = 1000$ and $g = 981$.

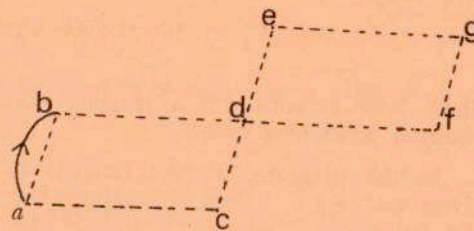
Give your answer to (b) correct to two places of decimals.

3. Prove that the area of a triangle is half the area of the rectangle on the same base and between the same parallels.

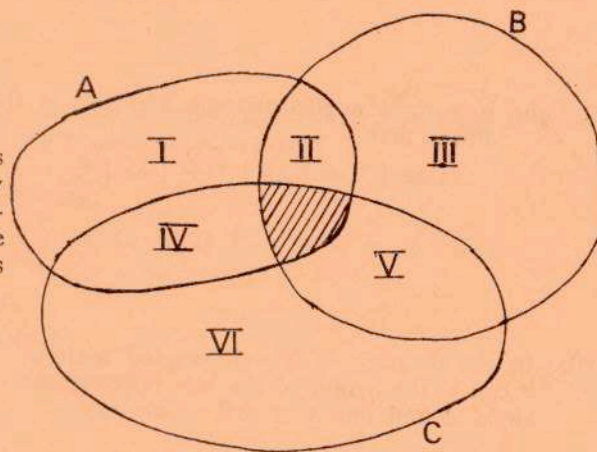
Construct a quadrilateral $abcd$ given that
 $|ab| = |bc| = |ca| = 5$ cm.,
 $bc \perp cd$.
Area of $\triangle abc =$ area of $\triangle bdc$.

4. $abdc$ and $degf$ are parallelograms as in diagram.

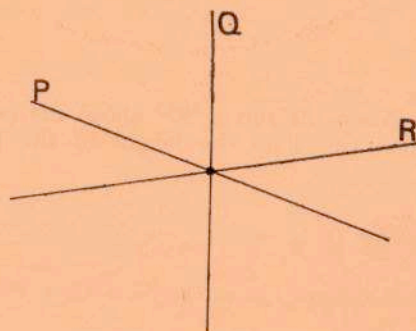
- (i) Write down all the ordered pairs (couples) that are equipollent to (a, b) .
(ii) What is the image of the point d by the translation \vec{ab} ?
(iii) What is the image of $\triangle acd$ by the translation \vec{ab} ?
(iv) What translation maps $abdc$ onto $degf$?



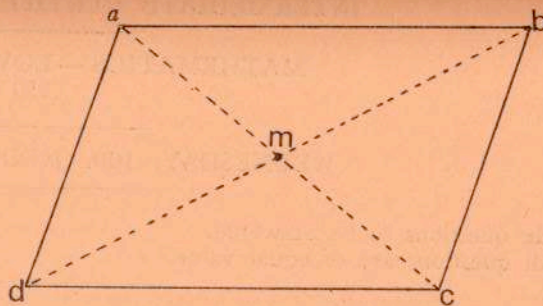
5. (a) Here is a Venn diagram of three lines A, B, C and the empty set is shaded. Draw the lines A, B, C which describe this situation. Say whether there is **one** or **more than one** element in each of the sets marked I, II, III, IV, V, VI.



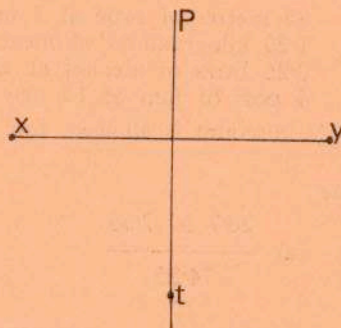
- (b) P, Q, R are three lines as in diagram. Draw a Venn diagram of this situation and **shade** each empty set.



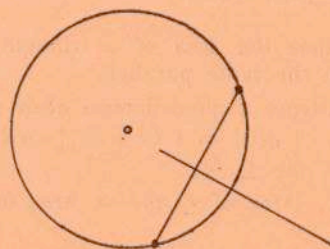
6. $abcd$ is a parallelogram.
 Prove that m is the midpoint of $[ac]$ and of $[bd]$.
 If S_m is the central symmetry in m , find
 (i) The image of a by S_m .
 (ii) The image of $\triangle abd$ by S_m .



7. The line P is the perpendicular bisector (mediator) of $[xy]$, as in diagram, and $t \in P$.
 Prove that $|tx| = |ty|$.

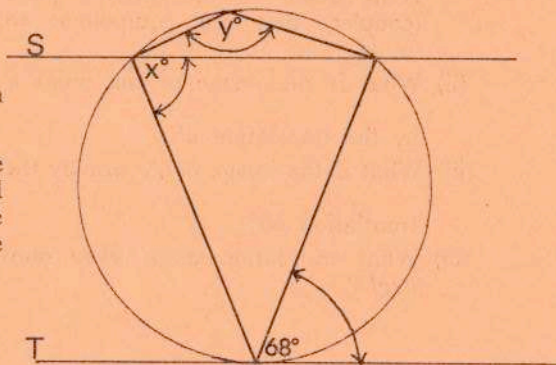


Hence, or otherwise, prove that the perpendicular bisector of a chord of a circle contains the centre of the circle.



8. Show how to construct a tangent from an external point to a circle.

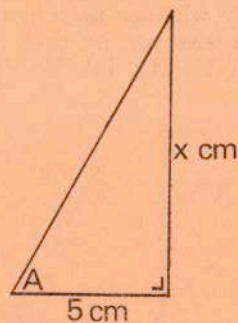
In the diagram, T is a tangent to the circle and $S \parallel T$. Find the value of x and the value of y , where x° and y° are the measures of the angles as indicated in the diagram.



9. abc is a right angled triangle and $[bc]$ is the side opposite the right angle.
 Prove that

$$|bc|^2 = |ab|^2 + |ac|^2.$$

10. In the diagram of a right angled triangle, x cm. is the length of the side opposite the angle A and $\tan A = 2.8$. Calculate x .



When the sun is 30° above the horizon, the shadow cast by a vertical pole is 10 metres long. Calculate the height of the pole correct to two significant figures.