

SHERBORNE SCHOOL.

ENTRANCE SCHOLARSHIP EXAMINATION, 1956.

Mathematics I.

(2 hours).

1. (a) The interior angle of a regular figure is x° . How many sides has the figure?
(b) $ABCDE$ is a regular pentagon inscribed in a circle. Prove that
 - (i) the angle ABC is trisected by BE and BD ;
 - (ii) AC is parallel to ED .
2. (a) Substitute $y - 1$ for x in
$$3(x + 2)^2 - 5(x - 3)^2 - 7x + 11,$$
and then simplify the new expression.
(b) A boy arrived at school with $\pounds x$ pocket money. He will want y shillings at the end of term for travelling expenses, and he has to pay a weekly subscription of z pence. How many shillings a week can he spend in a twelve week term?
3. A lighthouse bears $N.80^\circ E.$ from a coastguard station 10 miles away. The bearing of a lighthouse from a ship is $N.30^\circ W.$ and the bearing of the coastguard station from the ship is $N.70^\circ W.$ Find by accurate drawing the distance from the ship to the lighthouse:
If the ship is steaming $N.50^\circ W.$, and two hours later is due north of the coastguard station, find the speed of the ship.
4. Across a valley I can see a man beating a carpet. I count his strokes as follows: I count "one" as I start my stop-watch, and "twenty-one" as I stop it; it then reads 17.8 secs. I also notice that I hear the sound of each stroke at the instant when his hand and arm are raised for the next stroke; I judge this to be half-way between the two strokes. Sound travels at 1100 feet per second. How far is the man from me?

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5. Two boys are told to make a cylinder of given weight from the same material. One produces a cylinder of diameter 9 cm. and height 8 cm., the other one of diameter 8 cm. and height 7.5 cm. If the larger cylinder is 20% too heavy, by how much per cent is the smaller too light?
6. $ABCD$ is a trapezium with AB parallel to DC . It is found that AD is a tangent to the circle through A , B and C . Show that
- (i) the triangles ACD and BAC are similar.
 - (ii) $AC^2 = AB \times CD$.
7. If you have done any trigonometry please put down briefly any facts or formulae that you can remember. (This question will carry no marks but will be given general consideration both in selecting candidates and in placing those who eventually come to Sherborne).