2 How does Wormell, in his Section on angles in a circle, illustrate the following locus:—Given base and vertical angle of a triangle. Find the locus of the vertex.

3 Explain and prove the geometrical locus involved in the method of connecting the driving wheel with the adjacent wheel of a locomotive.

4 Write the converse, the opposite, and the contrapositive of the following Theorem:—When two triangles have three sides of the one respectively equal to the three sides of the other, the angles which are opposite to the equal sides are equal.

5 Assuming the truth of the Theorem stated in the preceding example, prove logically (not geometrically) the truth of the contrapositive.

6 Show how to cut up the squares on the sides of a right angled triangle into parts that will exactly cover the square on the base.

Female Candidates are not required to work the following, but credit will be given for work done.

7 If $\frac{A}{B}=\frac{C}{D}=\frac{E}{F}=\frac{G}{H}$, prove that $\frac{A}{B}=\frac{A+C+E+G}{B+D+F+H}$

8 Of all triangles having two sides given, that in which the sides contain a right angle is greatest.

I. [15] *Sept. '77.* NATURAL PHILOSOPHY. *Time, 1 hr. 30 m.*

1 Describe an experimental way of proving the principles of the parallelogram of forces.

2 Two forces of 10 lb and 42 lb act upon a point at an angle of 120°; find their resultant.

3 A B is a rod acted on at A and B by parallel forces P and Q. C is the point of application of their resultant R. Given that R = 154 lb, Q = 99 lb, A C = 5¼ ft.; find A B.

4 Show how to find experimentally the centre of gravity of a triangle. Where is the point situated in a triangle of uniform density?

5 Investigate the requisites of a good balance.

6 What horizontal force will support 100 lb on a plane inclined at an angle of 45°?

7 A body is projected downward with a velocity of 10 feet per second; what will be its velocity after it has traversed 75 feet?