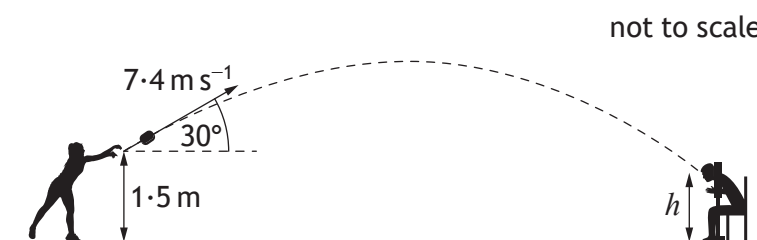


SECTION 2 — 110 marks

Attempt ALL questions

1. During a school funfair, a student throws a wet sponge at a teacher. The sponge is thrown with an initial velocity of  $7.4 \text{ m s}^{-1}$  at an angle of  $30^\circ$  to the horizontal.

The sponge leaves the student's hand at a height of  $1.5 \text{ m}$  above the ground.



The sponge hits the teacher.

The effects of air resistance can be ignored.

- (a) (i) Calculate:

- (A) the horizontal component of the initial velocity of the sponge; 1

*Space for working and answer*

- (B) the vertical component of the initial velocity of the sponge. 1

*Space for working and answer*



1. (a) (continued)

- (ii) Calculate the time taken for the sponge to reach its maximum height.

3

*Space for working and answer*

- (iii) The sponge takes a further 0.45 s to travel from its maximum height until it hits the teacher.

Determine the height  $h$  above the ground at which the sponge hits the teacher.

4

*Space for working and answer*

- (b) The student throwing the sponge makes the following statement.

*“If the sponge is thrown with a higher speed at the same angle from the same height then it would take a shorter time to hit the teacher in the same place.”*

Explain why the student’s statement is incorrect.

2



\* X 7 5 7 7 6 0 1 0 7 \*