

3. Read the passage in the resource folder carefully before answering the questions which follow.

- (a) (i) Define an elastic collision (paragraph 4). [1]

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- (ii) Use your definition to derive equation 2. [2]

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- (b) Draw the triangle (or parallelogram) to which paragraph 5 refers and label it. [3]

- (c) In equation 3,  $\theta$  depends on the ability of the player, and the difficulty of the pot increases as  $y$  increases. State how **each** of the other **four** variables affect  $y$ . [4]

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- (d) (i) Equation 4 suggests that it might be easier to see clearly a blue ball rather than a red ball. Explain this briefly. [2]

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- (ii) As light intensity decreases, the size of the pupil of the eye increases. This, combined with equation 4 suggests that professional snooker players might play better if the intensity of the lights was reduced. Explain this briefly. [2]

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- (e) Calculate the wavelength of light which the author used to calculate the smallest resolvable angle of the human eye (paragraph 11 and equation 4). [2]

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- (f) As  $W$  decreases,  $\theta$  increases (equation 4). Explain this in terms of diffraction. [1]

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- (g) Use equation 3 and diagram 6 to check the value of  $\theta = 0.6$  milliradians obtained by the author (paragraph 13). [Use the data given in the diagram and assume that the target ball is half way from the cue ball to the hole.] [3]

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