**5.** A biased 4-sided spinner has the numbers 6, 7, 8 and 10 on it.

The discrete random variable $X$ represents the score when the spinner is spun once and has the following probability distribution,

| $x$ | 6 | 7 | 8 | 10 |
|---|---|---|---|---|
| $P(X = x)$ | 0.5 | 0.2 | $q$ | $q$ |

where $q$ is a probability.

(a) Find the value of $q$

**(1)**

Karen spins the spinner repeatedly until she **either** gets a 7 **or** she has taken 4 spins.

(b) Show that the probability that Karen stops after taking her 3rd spin is 0.128

**(2)**

The random variable $S$ represents the number of spins Karen takes.

(c) Find the probability distribution for $S$

**(4)**

The random variable $N$ represents the number of times Karen gets a 7

(d) Find $P(S > N)$

**(1)**