**5.** Tisam is playing a game.
She uses a ball, a cup and a spinner.

The random variable $X$ represents the number the spinner lands on when it is spun.
The probability distribution of $X$ is given in the following table

| $x$ | 20 | 50 | 80 | 100 |
|---|---|---|---|---|
| $P(X = x)$ | $a$ | $b$ | $c$ | $d$ |

where $a$, $b$, $c$ and $d$ are probabilities.

To play the game

- the spinner is spun to obtain a value of $x$
- Tisam then stands $x$cm from the cup and tries to throw the ball into the cup

The event $S$ represents the event that Tisam successfully throws the ball into the cup.

To model this game Tisam assumes that

- $P(S \mid \{X = x\}) = \frac{k}{x}$ where $k$ is a constant
- $P(S \cap \{X = x\})$ should be the same whatever value of $x$ is obtained from the spinner

Using Tisam's model,

(a) show that $c = \frac{8}{5}b$

**(2)**

(b) find the probability distribution of $X$

**(5)**

Nav tries, a large number of times, to throw the ball into the cup from a distance of 100 cm.
He successfully gets the ball in the cup 30% of the time.

(c) State, giving a reason, why Tisam's model of this game is not suitable to describe Nav playing the game for all values of $X$

**(1)**