

1. A large college produces three magazines.

One magazine is about green issues, one is about equality and one is about sports.

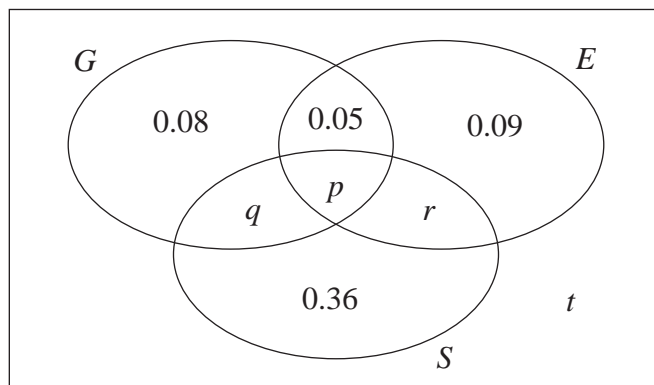
A student at the college is selected at random and the events G , E and S are defined as follows

G is the event that the student reads the magazine about green issues

E is the event that the student reads the magazine about equality

S is the event that the student reads the magazine about sports

The Venn diagram, where p , q , r and t are probabilities, gives the probability for each subset.



- (a) Find the proportion of students in the college who read exactly one of these magazines.

(1)

No students read all three magazines and $P(G) = 0.25$

- (b) Find

(i) the value of p

(ii) the value of q

(3)

Given that $P(S | E) = \frac{5}{12}$

- (c) find

(i) the value of r

(ii) the value of t

(4)

- (d) Determine whether or not the events $(S \cap E')$ and G are independent. Show your working clearly.

(3)

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2. A company has 1825 employees.
The employees are classified as professional, skilled or elementary.

The following table shows

- the number of employees in each classification
- the two areas, A or B , where the employees live

	A	B
Professional	740	380
Skilled	275	90
Elementary	260	80

An employee is chosen at random.

Find the probability that this employee

(a) is skilled, (1)

(b) lives in area B and is not a professional. (1)

Some classifications of employees are more likely to work from home.

- 65% of professional employees in both area A and area B work from home
- 40% of skilled employees in both area A and area B work from home
- 5% of elementary employees in both area A and area B work from home
- Event F is that the employee is a professional
- Event H is that the employee works from home
- Event R is that the employee is from area A

(c) Using this information, complete the Venn diagram on the opposite page. (4)

(d) Find $P(R' \cap F)$ (1)

(e) Find $P([H \cup R]')$ (1)

(f) Find $P(F | H)$ (2)

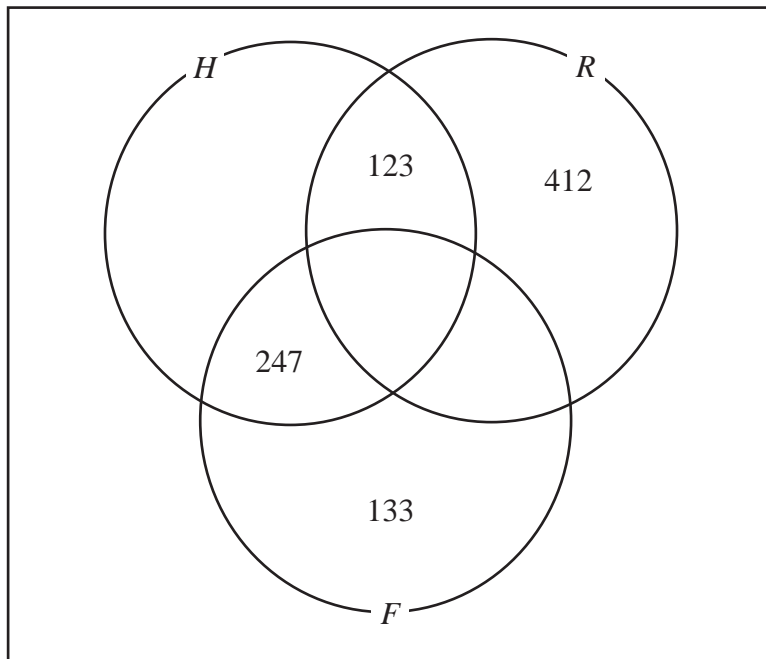
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Question 2 continued



Turn over for a spare diagram if you need to redraw your Venn diagram.

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4. 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

- $P(S | \{X = x\}) = \frac{k}{x}$ 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)

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