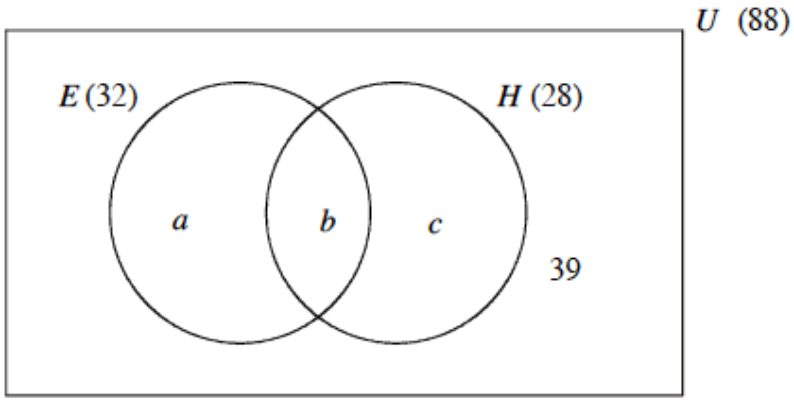
82.) In a school of 88 boys, 32 study economics (E), 28 study history (H) and 39 do not study either subject. This information is represented in the following Venn diagram.




(a) Calculate the values $a, b, c$.

(b) A student is selected at random.

(i) Calculate the probability that he studies **both** economics and history.

(ii) Given that he studies economics, calculate the probability that he does **not** study history.

(c) A group of three students is selected at random from the school.

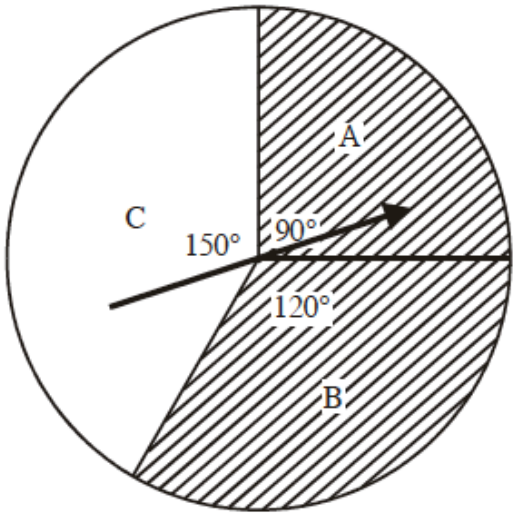
(i) Calculate the probability that none of these students studies economics.

(ii) Calculate the probability that at least one of these students studies economics.

2.) The events $A$ and $B$ are independent such that $P(B) = 3P(A)$ and $P(A \cup B) = 0.68$. Find $P(B)$

NAME:_____ Paper Preview Probability DATE: 02/27/15

77.) The following diagram shows a circle divided into three sectors A, B and C. The angles at the centre of the circle are 90°, 120° and 150°. Sectors A and B are shaded as shown.




The arrow is spun. It cannot land on the lines between the sectors. Let $A$, $B$, $C$ and $S$ be the events defined by

$A$: Arrow lands in sector A

$B$: Arrow lands in sector B

$C$: Arrow lands in sector C

$S$: Arrow lands in a shaded region.

Find

(a) $P(B)$;

(b) $P(S)$;

(c) $P(A|S)$.

_____

_____

3.) A fair coin is tossed five times. Calculate the probability of obtaining

(a) exactly three heads;

(b) at least one head.

_____

_____

NAME:_____ Paper Preview Probability DATE: 02/27/15

57.) In a class, 40 students take chemistry only, 30 take physics only, 20 take both chemistry and physics, and 60 take neither.

(a) Find the probability that a student takes physics given that the student takes chemistry.

(b) Find the probability that a student takes physics given that the student does **not** take chemistry.

(c) State whether the events "taking chemistry" and "taking physics" are mutually exclusive, independent, or neither. Justify your answer.

**(Total 6 marks)**

_____

_____

_____

_____

4.) Let $A$ and $B$ be independent events such that $P(A) = 0.3$ and $P(B) = 0.8$.

(a) Find $P(A \cap B)$.

(b) Find $P(A \cup B)$.

(c) Are $A$ and $B$ mutually exclusive? Justify your answer.

_____

_____

_____

5.) A company uses two machines, A and B, to make boxes. Machine A makes 60 % of the boxes.

80 % of the boxes made by machine A pass inspection.
90 % of the boxes made by machine B pass inspection.

A box is selected at random.

(a) Find the probability that it passes inspection.

**(3)**

(b) The company would like the probability that a box passes inspection to be 0.87. Find the percentage of boxes that should be made by machine B to achieve this.

**(4)**

**(Total 7 marks)**

NAME:_____ Paper Preview Probability DATE: 02/27/15

6.) The letters of the word PROBABILITY are written on 11 cards as shown below.

| P | R | O | B | A | B | I | L | I | T | Y |
|---|---|---|---|---|---|---|---|---|---|---|

Two cards are drawn at random without replacement.
Let $A$ be the event the first card drawn is the letter A.
Let $B$ be the event the second card drawn is the letter B.

(a) Find $P(A)$.

**(1)**

(b) Find $P(B \mid A)$.

**(2)**

(c) Find $P(A \cap B)$.

**(3)**
**(Total 6 marks)**

7.) Let $A$ and $B$ be independent events, where $P(A) = 0.6$ and $P(B) = x$.

(a) Write down an expression for $P(A \cap B)$.

(b) Given that $P(A \cup B) = 0.8$,

(i) find $x$;

(ii) find $P(A \cap B)$.

(c) **Hence**, explain why $A$ and $B$ are **not** mutually exclusive.

**NAME:**_____ **Paper Preview Probability DATE: 02/27/15**

Answer key (ensure you show all calculations for full marks)

82.) a) a = 21; b = 11; c = 17
bi) 1/8 bii) 21/32
ci) 25.3% cii) 74.7%

2.) P(B) = 0.6

77.) a) 1/3 ; b) 7/12 ; c) 3/7

3.) a) skip this question b) 31/32

57.) a) 1/3 ; b) 1/3 ; c) Not mutually exclusive, but they are independent mathematically

4.) a) 0.24 ; b) 0.86 ; c) No

5.) a) 84% b) 70%

6.) a) 1/11 ; b) 1/5 ; c) 1/55

7.) a) 0.6x ; bi) x = 0.5 bii) 0.3