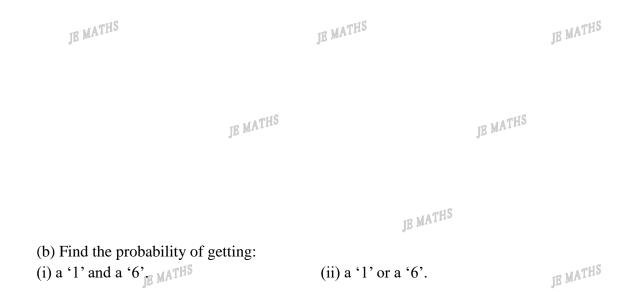
Fou	un	da	atio	on	stage	1:	(Ba	sic	prol	oabil	ity	and	san	ıple	spa	ace)	
1		1			1			1			. 1	0 ( 1		C	.1		1.

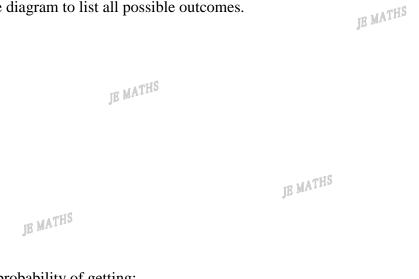
1.	A letter is chosen at random from the 26 letters of the English alphabet. Find the probability that is						
	(a) a vowel.	(b) a consonant.					
	JE MATHS	JE MATHS	JE MATHS				
	(c) a letter of the word 'AARON'.	(d) not a letter of the word 'AAI	RON'.				
	JE MATHS	JE MATHS					
2.	A letter is randomly selected from the (a) List the sample space.	word 'PIMPLE'.					
		JE MATHS					
	<ul><li>(b) Find the probability that it is:</li><li>(i) a P.</li></ul>	(ii) also from the word 'APPLE	JE MATHS				
		JE MATHS					
3.	A box containing a light bulb has chan- (a) If 180 boxes were checked, how ma	ce of $\frac{1}{15}$ of holding a defective bulbany would you expect to hold defective	re bulbs?				
	(b) Hence, find the probability that the	box holds that works?					
4.	(a) When a die is rolled, the theoretical number, correct to one decimal place, t	I probability of throwing a six is $\frac{1}{6}$ . Finally, that you will get if a die is thrown 100	and the expected times.				
	(b) In an experiment, a certain die was Find the relative frequency (experiment JB MATHS	-	16 times.  JE MATHS				
	(c) Hence, check if the die is biased or	fair. Why?					

#### Foundation stage 2: (Using arrays and tree diagram)

- 1. A fair die is tossed twice.
  - (a) Use arrays on a number plane to list all possible outcomes.



- 2. From a group of four students, Andy, Bessie, Cathy, Danny, two are chosen at random, one after another, to be the captain and vice-captain.
  - (a) Use a tree diagram to list all possible outcomes.



- (b) Find the probability of getting:
- (i) Andy is chosen.

(ii) Bessie is captain.

JE MATHS JE MATHS JE MATHS

- (iii) Cathy and Danny are chosen.
- (iv) Cathy or Danny are chosen.

## **Foundation stage 3: (The addition rule)**

1. Given that the universal set  $E = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ , A is a set of odd numbers within  $10 = \{1,3,5,7,9\}$  and

B is a set of prime numbers within  $10 = \{2, 3, 5, 7\}$ .

- (a) Find:
- (i) A MATHS

(ii)  $\overline{B}^{S}$ 

JE MATHS

- (iii)  $A \cup B$
- JE MATHS
- (iv)  $|A \cup B|$



(v)  $A \cap B$ 

(vi)  $|A \cap B|$ 

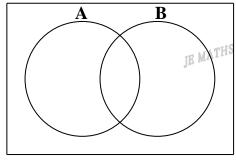


- (b) If C is a set of even numbers within 10, check if the following statement is true or not:
- (i)  $B \cap C = \emptyset$

(ii) C⊂E

(iii) BUA = E

- (iv) |A| = |B|
- (b) Hence, make a Venn diagram (labeled) and two-way table below: MATHS



JE MATHS

	Α	$ar{A}$	Т
В	es.	*	
$ar{B}$	e e		
Т		*	08

JE MATHS

- (c) Find:
- (i)  $\left|A \cap \overline{B}\right|$

(ii) P(A only)

(iii)  $|\overline{A} \cap B|$ 

(iv) P(B only)

JE MATHS

(v)  $\left| \overline{A} \cap \overline{B} \right|$ 

(vi)  $P(neither\ A\ nor\ B)$ 

## 2. Match up with lines:

(a) A and B

*(α)* A∪B

(A) A B

(b) A or B

- $(\beta)$  AOB MATHS
- (B) A BATH

## 3. A die is thrown.

Let A be the event that an even number appears, B be the event that an odd number appears.

- (a) Check if A and B are mutually exclusive or non-mutually exclusive? mutually exclusive
- (b) Find
- (i) P(A and B)

(ii) P(A or B)

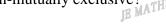




4. Two cards are selected from **two** packs of 52 cards seperately.

Let A be the event that an Ace card appears and B be the event that a black card appears.

(a) Check if A and B are mutually exclusive or non-mutually exclusive?



- (b) Find
- (i) *P*(*black Ace*)



(ii) P(black or Ace)



- 5. Use the addition rule  $P(A \cup B) = P(A) + P(B) P(A \cap B)$  to answer the following questions
  - (a)  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cap B) = \frac{1}{12}$ , find  $P(A \cup B)$ .







(b)  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cup B) = \frac{1}{4}$ , find  $P(A \cap B)$ .

Foundation stage 4: (Th	e product rule)
-------------------------	-----------------

Fo	undation stage 4: (The product rule)	)	
1.			
	Find the probability of getting:	6.1 1 1	
	(a) a double, given that the number '6	o is selected.	
			775
	JE MATHS	JE MATHS	JE MATHS
	(b) a number '1' and '6', given that the	ne number '1' or '6' are selecte	ed.
	JE MATH	V	JE MATHS
		ATHS	
		JE MATHS	
2.	From a group of four students, Andy,		e chosen at random, one after
	another, to be the captain and vice-ca	ptain.	
	Find the probability of getting: (a) Bessie is captain and Andy is a vio	ce-cantain given that Andy is	selected
		JB MATHS	sciected.
		•	
	JE MATHS		JE MATHS
	JR 1827		IR w.
	(b) Cathy and Danny, given that Cath	y or Danny are selected	
		ly of Builly are selected.	
		JE MATHS	
		IR w	
	JB MATHS		
3.	True or false:		
٥.		A D/A I D/A	D/ A\
	(a) If two events A, B are independen	it event, then $P(A \text{ and } B) = P(A \text{ and } B)$	$Y(A)\times P(B)$ .
		THS	Lates
	JE MATHS	JE MATHS	JE MATHS

(b) If two events A, B are dependent event, then  $P(A \text{ and } B) = P(A) \times P(B, given A)$ .

4.	A coin is tossed 4 times.  (a) Check if the events are independent event or dependent event.							
	(b) List the outcome in the same (i) 1 heads: IS	mple space o	f getting:  (ii) 2 heads.		JE MATHS			
	(c) Hence, use the product rul (i)1 heads.	e to find the	probability of getting: (ii) 2 heads.	JE MATHS				
		- Marie						
5.	Two cards are selected from <b>t</b> Let A be the event that an Ace (a) Check if A and B are indep	e card appear	s and B be the event that	a black card	appears.  JE MATHS			
	(b) Hence, use the product rul (i) a black Ace.	e to find the	probability of getting (ii) a red club					
	JE MATHS	. man	-	JE MATHS				
6.	Two cards are selected from on Let A be the event that an Ace (a) Check if A and B are indep	e card appear	s and B be the event that	a black card	appears.			
	_		JE MATHS					
	<ul><li>(b) Hence, use the product rule to find the probability of getting</li><li>(i) a black Ace.</li></ul>							
	Annual Congressment of the Congress of the Con							
	JE MATHS (ii) a red club.		JE MATHS		JE MATHS			
	-401-1750 American Mark State Mark State S							

# Foundation stage 5: (Probability tree diagram and condition probability) 1. A bag contains six red marbles and four blue marbles.

Three marbles are selected in succession  (a) Find the probability of getting:  (i) three red marbles.		
JE MATHS	JE MATHS	JE MATHS
(ii) first red, second blue and third red n	narble.	JE MATHS
JB MA		IB was
(iii) two red marble and 1 blue marble.	JE MATHS	
a mus		orlis
JE MATHS		JE MATHS
	. mile	
(iv) at least two red marbles.	JE MATHS	
		JE MATHS
JE MATHS		
(v) two red marbles given that at least tw		ie, find $P(2R \geq 2R)$ .
	JE MATHS	
JE MATHS		
(f) If the marble is red it is replaced a getting two red marble.	and it is blue it is not rep	placed, find the probability of
JE MATHS	JE MATHS	JE MATHS
•		
1		
-		

## Foundation stage 1: (Basic probability and sample space)

- 1. (a
  - P(A, E, I, O, U) = 5/26

- (b)
- 1- P(vowel) = 1-5/26 = 21/26

- (c)
- P(A, R, O, N) = 4/26 = 2/13
- (d)
- 1- P(A, R, O, N) = 1 2/13 = 11/13

- 2. (a)  $\{P, I, M, L, E\}$ 
  - (b)
  - (i)

- JE MATHS
- (ii)

JE MATHS

- P(P) = 2/6 = 1/3
- P(P, L, E) = 3/6 = 1/2
- 3. (a)  $180 \times 1/15 = 12$ 
  - (b) 180-12 = 168

JE MATHS

4. (a)  $100 \times 1/6 = 16.7_{\text{MATHS}}$ 

IR MATHS

- (b) 16/100 = 0.16
- (c)  $1/6 \neq 0.16$ , it is biased.
- JE MATHS

JE MATHS

JE MATHS

- JE MATHS

JE MATHS

JE MATHS

JE MATHS

JE MATHS

## Foundation stage 2: (Using arrays and tree diagram)

- 1. (a)
- 6 5 4 Jl JE MATHS 3 2 1

3

JE MATHS

4

D

JE MATHS

JE MATHS

JE MATHS

JE MATHS

(b)

(i)

P(1 and 6) = 2/36 = 1/18

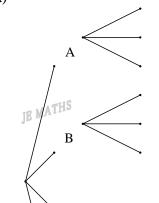
1

2

(ii)

P(1 or 6) = 11/36

2. (a)



C

D

(A, B) В

5

6

- C (A, C)
  - JE MATHS (A, D)
- A (B, A)
- C (B, C)
- D (B, D)
- JE MATHS
- (C, A) A
- В (C, B)
- D (C, D)
- A (D, A)
- В (D, B)
- C (D, C)

- (b)
- (i) P(A) = 6/12 = 1/2

- (ii)
- P(B first) = 3/12 = 1/4

JE MATHS

- (iii)
- P(C and D) = 2/12 = 1/6

- (iv)
- P(C or D) = 10/12 = 5/6

## **Foundation stage 3: (The addition rule)**

- 1. (a)
  - (i)
  - |A| = 5

- (ii)
- $\bar{B} = \{1, 4, 6, 8, 9, 10\}$

- (iii)
- (iii)  $A \cup B = \{1, 2, 3, 5, 7, 9\}$

(iv) THS  $|A \cup B| = 6$  JE MATHS

- (v)
- $A \cap B = \{3, 5, 7\}$

- (vi)
- $|A \cap B| = 3$
- JE MATHS

JE MATHS

- (b)
- (i)
- F

- (ii)
- T

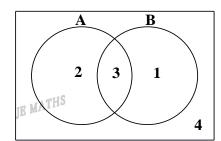
- (iii)
- T

- (iv)
- T

JE MATHS (b)

JE MATHS

JE MATHS



JE MATHS

	Α	$ar{A}$	Т				
В	(3)	(1)	(4)				
$ar{B}$	(2)	(4)	(6)				
Т	(5)	(5)	(10)				
	E.E. Tilo.						

- (c)
- (i)
- 2

- JE MATHS
- P(A only) = 2/10 = 1/5

- (iii)
- 1

(iv)

(ii)

 $P(B \text{ only}) = 1/10^{ATHS}$ 

- (v)
- 4

- (vi)
- P(neither A nor B) = 4/10 = 2/5

- 2. (a)- $(\beta)$ -(B), (b)- $(\alpha)$ -(A)
- 3. (a) mutually exclusive

JE MATHS

JE MATHS

- (b)
- (i)
- $P(A \text{ and } B) = P(A \cap B)$  $= \emptyset$

(ii)

$$P(A \text{ or } B) = P(A \cup B)$$
  
= 1/2 + 1/2  
= 1

## 4. (a) non-mutually exclusive

(b)

(i)

P(A and B) = P(A \cap B)  $\int_{\mathbb{R}} \frac{A}{A} \int_{\mathbb{R}} \frac{2}{52} dx$ = 1/26 (ii)

 $P(A \text{ or } B) = P(A \cup B)$  = 26/52 + 4/52 - 2/52 = 28/52= 7/13

5. (a)  $P(A \cup B) = 1/2 + 1/3 - 1/12 = 3/4$ 

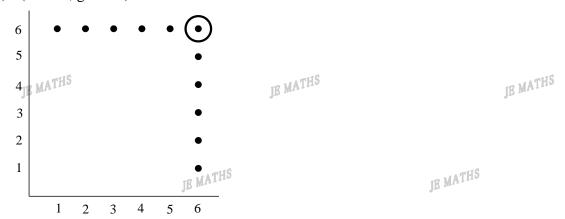
TE MATHS

(b)  $P(A \cap B) = 1/2 + 1/3 - 1/4 = 7/12$ 

JE MATHS

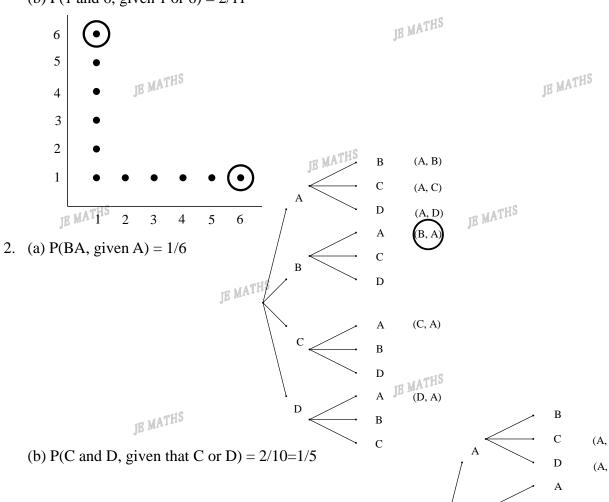
## **Foundation stage 4: (The product rule)**

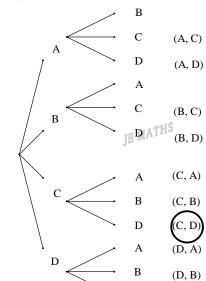
1. (a) P(double, given 6) = 1/11



(b) P(1 and 6, given 1 or 6) = 2/11

JE MATHS





12

JE MATHS

3.	True or false: (a) (T)		
	(b) (T)		
4.	(a) independent event	JE MATHS	JE MATHS
	(b)		
	(i)	(ii)	
	{HTTT, THTT, TTHT, TTTH}	{ННТТ, НТНТ, НТТН, ТТНН, Т	THHT, HTTH}
	JE MATHS	JE MATHS	
	(c)		
	(i)	(ii)	
	$P(1H) = 4 \times (1/2 \times 1/2 \times 1/2 \times 1/2)$	$P(2H) = 6 \times (1/2 \times 1/2 \times 1/2 \times 1/2)$	
	=4/16=1/4	= 6/16 = 3/8	
5.	(a) independent event	-	
٥.	JE MATHS		JE MATHS
	(p) 18 My.		JR WY.
	(i)	(ii)	
	$P(black Ace) = P(black) \times P(Ace)$	$P(red club) = P(red) \times P(red)$	(club)
	$= 26/52 \times 4/52$	$ \begin{array}{ll} \text{JE MATHS} & \text{F(led Club)} = \text{F(led)} \times \text{F(} \\ &= 26/52 \times 12/5 \end{array} $	2
	= 1/26	= 3/26	
6.	(a) dependent event	JE MATHS	
	(b)		
	(i) D(1 1 A ) P(1 1 ) P(A)	11 1 1 1 1 1 1	
	P(alack Ace) = P(black) $\times$ P(Ace, given on = $26/52 \times 4/51$ (1 black car	e black card is selected) rd is selected, then 4 Ace cards in the	ne rest of 51 cards)
	$= 20/32 \times 4/31$ (1 black call $= 2/51$	d is selected, then 4 Acc cards in th	ic rest of 31 cards)
	2,01	. TIS	
	(ii)	JE MATHS	
	$P(\text{red club}) = P(\text{red}) \times P(\text{club, given one red})$		
	•	is selected, then 12 club cards in the	e rest of 51 cards)
	= 2/17		

JE MATHS

## Foundation stage 5: (Probability tree diagram and condition probability)

1. (a)

$$P(RRR) = 6/10 \times 5/9 \times 4/8$$
  
= 1/6

JE MATHS

JE MATHS

JE MATHS

(ii)

$$P(RBR) = 6/10 \times 4/9 \times 5/8$$
$$= 1/6$$

JE MATHS

JE MATHS

(iii)

List two red and 1 blue marble: {RRB, RBR, BRR}

P(two R, 1B) = 
$$3 \times P(RBR)$$
  
=  $3 \times 1/6$   
=  $1/2$ 

JE MATHS

JE MATHS

(iv)

At least two red marbles means two red marbles and three red marbles notice two red marbles means two red and 1 blue marble

 $P(\text{at least } 2R) = P(\geq 2R)$ 

JB MATHS = 
$$P(2R) + P(3R)$$
  
=  $1/2 + 1/6$   
=  $2/3$ 

JE MATHS

(v)

$$P(2R|\geq 2R) = P(2R \cap \geq 2R)/P(\geq 2R)$$
  
= (1/2) \div(2/3)  
= 3/4

(f)

JE MATHS

List two red and 1 blue marble: {RRB, RBR, BRR}

$$P(RRB) = 6/10 \times 6/10 \times 4/10 = 18/225$$
  
 $P(RBR) = 6/10 \times 4/10 \times 6/9 = 4/25$ 

$$P(BRR) = 4/10 \times 6/9 \times 6/9 = 8/45$$

$$P(2R) = P(RRB) + P(RBR) + P(BRR)$$
$$= 18/225 + 4/25 + 8/45$$

$$= 94/225$$

JE MATHS