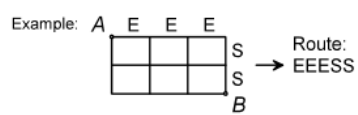
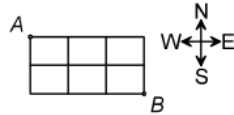


9. In the grid below, a person must travel from A to B by only heading East (E) or South (S). One example of a route is shown representing three moves East followed by two moves South (EEESS). Under these rules, which represents the total number of possible routes that can be taken to get from A to B?

repeating  
 $\frac{n!}{a! \cdot b!}$



- (A)  $\frac{5!}{3!2!}$
- (B)  $\frac{6!}{3!2!}$
- (C) 5!
- (D) 6!

EEESS  
 $\frac{5!}{3!2!}$

10. There are 7 marbles in a bowl: 2 white, 3 green and 2 blue. If taken out one at a time, in how many different ways can all 7 marbles be taken out of the bowl?

- (A) 105
- (B) 210
- (C) 420
- (D) 5040

WW GGG BB

$\frac{7!}{2! \cdot 3! \cdot 2!}$   
 $\frac{5040}{24}$

11. A soccer player has 17 attempts on net and 6 goals scored. What are the odds in favour of her scoring a goal on her next attempt?

- (A) 6 : 11
- (B) 6 : 17
- (C) 11 : 6
- (D) 17 : 6

6 goals 11 misses

total

12. A committee of three people will be randomly chosen from a group of nine people; 5 females and 4 males. Which represents the probability of selecting a committee that has at least one male and at least one female member?

- (A)  $\frac{{}_4C_1 \times {}_5C_2 + {}_4C_2 \times {}_5C_1}{{}_9C_3}$
- (B)  $\frac{{}_4C_0 \times {}_5C_3 + {}_4C_3 \times {}_5C_0}{{}_9C_3}$
- (C)  $\frac{{}_9C_1 \times {}_5C_2 + {}_9C_2 \times {}_5C_1}{{}_4C_3 \times {}_5C_3}$
- (D)  $\frac{{}_9C_1 \times {}_4C_2 + {}_9C_2 \times {}_4C_1}{{}_4C_3 \times {}_5C_3}$

prob =  $\frac{\text{fav}}{\text{total}}$

${}_9C_3$

1 male  
 ${}_4C_1 \cdot {}_5C_2$

1 female  
 ${}_4C_2 \cdot {}_5C_1$

13. A and B are mutually exclusive events. The probability that either A or B will occur,  $P(A \cup B)$ , is 56%. If the probability of A occurring,  $P(A)$ , is 17%, what is the probability of B not occurring,  $P(B')$ ?

- (A) 27%
- (B) 39%
- (C) 61%
- (D) 73%

$P(A) + P(B) = 56\%$   
 $17\% + P(B) = 56\%$

$P(B) = 39\%$

$100 - 39 = P(B')$

14. You have a six-sided die with each side numbered one through six. You also have a coin with heads on one side and tails on the other. What is the probability of rolling a number greater than 4 with the die and tossing heads with the coin?

- (A)  $\frac{1}{12}$   
 (B)  $\frac{1}{6}$   
 (C)  $\frac{1}{4}$   
 (D)  $\frac{1}{3}$

$5+6$   
 $\frac{2}{6} \cdot \frac{1}{2} = \frac{2}{12} = \frac{1}{6}$

15. A deck of 40 cards consists of 4 different coloured sets: red, blue, green and yellow. Each set is numbered from 0 to 9 as shown below. If two cards are randomly picked from the deck, what is the probability that the first card is blue or green and the second card is also blue or green?

Card Colour	Cards
red	0 1 2 3 4 5 6 7 8 9
blue	0 1 2 3 4 5 6 7 8 9
green	0 1 2 3 4 5 6 7 8 9
yellow	0 1 2 3 4 5 6 7 8 9

$\frac{20}{40} \cdot \frac{19}{39}$   
 BorG

- (A)  $\frac{1}{20}$   
 (B)  $\frac{19}{80}$   
 (C)  $\frac{19}{78}$   
 (D)  $\frac{1}{4}$

16. What are the non-permissible values for the rational expression  $\frac{3x}{5(4-x)(2x+1)}$ ?

- (A)  $\{-4, \frac{1}{2}\}$   
 (B)  $\{-4, \frac{1}{2}, 5\}$   
 (C)  $\{-\frac{1}{2}, 4\}$   
 (D)  $\{-\frac{1}{2}, 4, 5\}$

Denominator  $\neq 0$

$4-x \neq 0$   
 $4 \neq x$

$2x+1 \neq 0$   
 $2x \neq -1$   
 $x \neq -\frac{1}{2}$

17. What is the simplified form of  $\frac{x^2}{x^2-5x}$ ,  $x \neq 0, 5$ ?

- (A)  $-5x$
- (B)  $-\frac{1}{5x}$
- (C)  $\frac{x}{x-5}$
- (D)  $\frac{1}{1-5x}$

$$x \frac{x^2}{(x-5)} = \frac{x^3}{(x-5)}$$

18. What expression is equivalent to  $\frac{x+5}{x-4}$ ,  $x \neq 4$ ?

- (A)  $\frac{x^2+5x}{x^2-4x}$
- (B)  $\frac{2x+10}{x-4}$
- (C)  $\frac{3x+5}{3x-4}$
- (D)  $\frac{5x+25}{5x-20}$

\* multiply by a constant

everything multiplied by 5.

19. Simplify:  $\frac{12-4x}{2x^2-18}$

- (A)  $\frac{-2}{x-3}$ ,  $x \neq -3, 3$
- (B)  $\frac{-2}{x+3}$ ,  $x \neq -3, 3$
- (C)  $\frac{2}{x-3}$ ,  $x \neq -3, 3$
- (D)  $\frac{2}{x+3}$ ,  $x \neq -3, 3$

$$\frac{4(3-x)}{2(x^2-9)} = \frac{4(3-x)}{2(x+3)(x-3)}$$

$$= \frac{-2}{(x+3)}$$

20. Simplify:  $\frac{6x}{9} \div \frac{4x^3}{3}$

- (A)  $\frac{1}{2x^2}$ ,  $x \neq 0$
- (B)  $2x^2$ ,  $x \neq 0$
- (C)  $\frac{9}{8x^4}$ ,  $x \neq 0$
- (D)  $\frac{8x^4}{9}$ ,  $x \neq 0$

$$\frac{6x}{9} \cdot \frac{3}{4x^3}$$

$$\frac{18x}{36x^3} = \frac{1}{2x^2}$$

21. Simplify:  $\frac{2x}{x+3} - \frac{5x}{2x+6}$

(A)  $\frac{-3x}{-x-9}, x \neq -3$

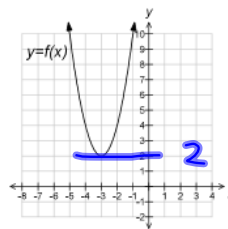
(B)  $\frac{-3x}{-x-3}, x \neq -3$

(C)  $\frac{-x}{2(x+3)}, x \neq -3$

(D)  $\frac{x}{2(x+3)}, x \neq -3$

*Handwritten work:*  
 $\frac{2x}{x+3} - \frac{5x}{2(x+3)}$   
 C.D:  $2(x+3)$   
 $\frac{2x(2)}{2(x+3)} - \frac{5x}{2(x+3)}$   
 $\frac{4x-5x}{2(x+3)} = \frac{-x}{2(x+3)}$

22. What is the range of the function  $y = f(x)$  shown in the graph below?



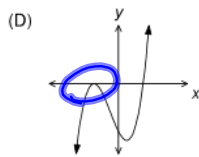
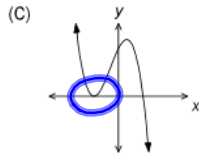
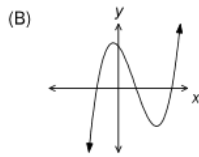
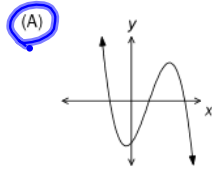
- (A)  $\{y \mid y < -2, y \in R\}$
- (B)  $\{y \mid y \geq -2, y \in R\}$
- (C)  $\{y \mid y < 2, y \in R\}$
- (D)  $\{y \mid y \geq 2, y \in R\}$

23. What is the y-intercept of the graph of the function  $f(x) = 4x^3 + x^2 + 2x + 1$ ?

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- Handwritten work:*  
 $\rightarrow \text{let } x = 0$   
 $4(0)^3 + (0)^2 + 2(0) + 1 = 1$

24. Which graph best represents a function with the characteristics listed below?

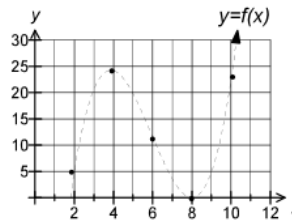
- Three x-intercepts
- Extending from Quadrant II to Quadrant IV



> two intercepts

25. Given the table, the scatter plot and the curve of best fit of the polynomial  $f(x)$ , what is the value of  $f(5)$ ?

x	y
2	5
4	24
6	12
8	0
10	23



- (A) 2  
 (B) 9  
 (C) 18  
 (D) 20