

TEACHERS COLLEGES OF JAMAICA

BACHELOR OF EDUCATION

MAY 2022 EXAMINATIONS

COMMON PAPER

MATHEMATICS

FOUNDATION CONCEPTS IN MATHEMATICS 2

[MT020SEB]

**YEAR 1
SECONDARY**

TIME: 2 HOURS

INSTRUCTIONS: Candidates are required to answer ALL questions in Section A and Section B.

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

SECTION A

Answer **ALL** questions in this section.

1. There are 2 vans for every 7 cars parked in a lot. What combination of vans and cars can be on the lot?
 - a) 16 vans and 56 cars
 - b) 14 vans 42 cars
 - c) 9 vans 63 cars
 - d) 4 vans and 9 cars

2. James is able to type 180 words per minute. How many words can he type in 15 seconds if he types at the same rate?
 - a) 12
 - b) 45
 - c) 540
 - d) 720

3. The probability of getting less than 3 in a single throw of a die is
 - a) $\frac{1}{2}$.
 - b) $\frac{2}{3}$.
 - c) $\frac{1}{4}$.
 - d) $\frac{1}{3}$.

4. The letters of the word SOCIETY are placed at random in a row. The probability of getting a vowel is
 - a) $\frac{1}{7}$.
 - b) $\frac{2}{7}$.
 - c) $\frac{3}{7}$.
 - d) $\frac{4}{7}$.

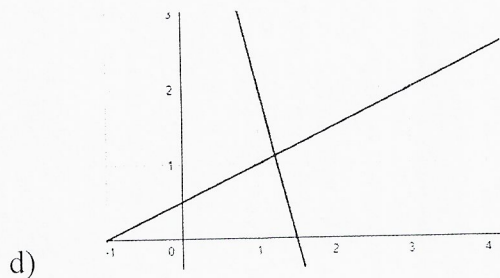
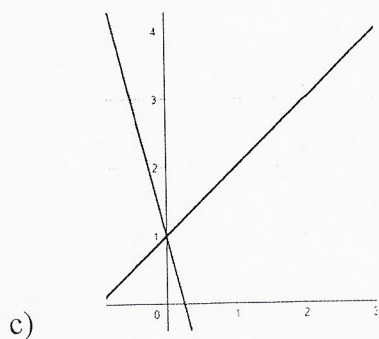
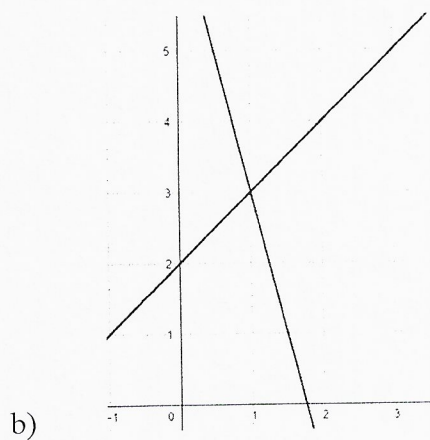
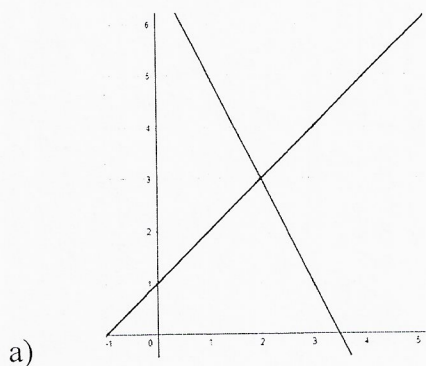
5. Half the product of two numbers **a** and **b** added to thrice a third number **c** is
- a) $\frac{1}{2}a \times b + 3c.$
 - b) $\frac{1}{2} \times a + b + 3c.$
 - c) $\frac{a \times b}{2} + 3c.$
 - d) $\frac{a \times b + 3c}{2}.$
6. If $6n - 4 = 8$ then $n =$
- a) 10.
 - b) 2.
 - c) 4.
 - d) 6.
7. The mean weight of five complete computer stations is 167.2 pounds. The weights of four of the computer stations are 158.4 pounds, 162.8 pounds, 165 pounds, and 178.2 pounds respectively. What is the weight of the fifth computer station?
- a) 161
 - b) 170.4
 - c) 160.8
 - d) 171.6
8. A set of four numbers that begins with the number 72 is arranged from smallest to largest. If the median is 75, which of the following could possibly be the set of numbers?
- a) 72, 72, 76, 78
 - b) 72, 75, 78, 71
 - c) 72, 74, 76, 75
 - d) 72, 76, 70, 74
9. A man earns \$16,300 for a 50-hour week. His weekly earnings are increased by 10%, but his hours are cut by 10%. What are his new earnings?
- a) \$16,300
 - b) \$16,137
 - c) \$13,203
 - d) \$19,723

10. Kenroy wants to buy an item at the appliance store. The item cost \$12,200 cash and he is offered a bank loan of \$12,200 for a year at 18% p.a. simple interest to make the purchase. How much will he repay the bank?
- \$14,396
 - \$14,000
 - \$2,196
 - \$10,004
11. Palesa invests \$2,000 in an account that offers her 9.5% compound interest rate p.a. After two years she moves her money to an investment bank that can offer her 11.2% growth, compounded annually, on her investment. How much is Palesa's investment worth after 8 years?
- \$3,792.00
 - \$4,675.93
 - \$4,534.06
 - \$4,133.74
12. Simplify the following expression $\left(-\frac{5p^2q}{18}\right) \times 3pq^3 \times \left(-6p^{\frac{1}{2}}q^2\right)$
- $\frac{90p^{\frac{1}{2}}q^6}{18}$
 - $-\frac{90p^{\frac{1}{2}}q^6}{18}$
 - $5p^{\frac{7}{2}}q^6$
 - $-5p^{\frac{7}{2}}q^6$
13. $\frac{1}{7}(49x - 14y) - \frac{1}{14}(14x - 28y)$ expressed in its simplest form is
- $3x - y.$
 - $-5x + 2y.$
 - $6x + 6y.$
 - $6x.$
14. $36 - 9a^2$ can be expressed as
- $(36 - 9a)(36 + 9a).$
 - $(3a - 6)(3a + 6).$
 - $(9a - 36)(9a + 36).$
 - $(6 + 3a)(6 - 3a).$

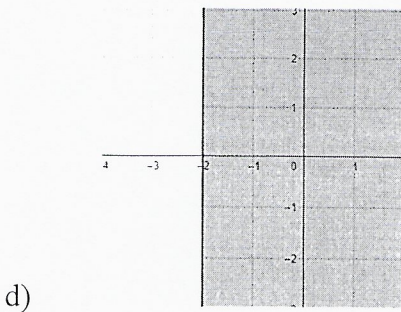
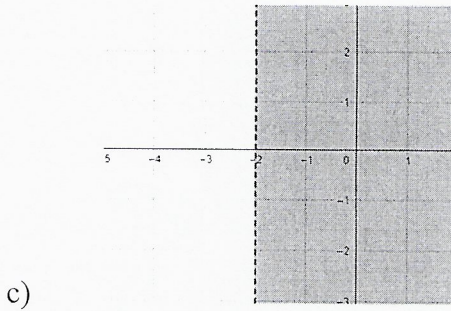
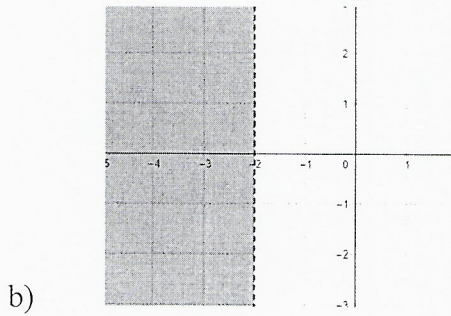
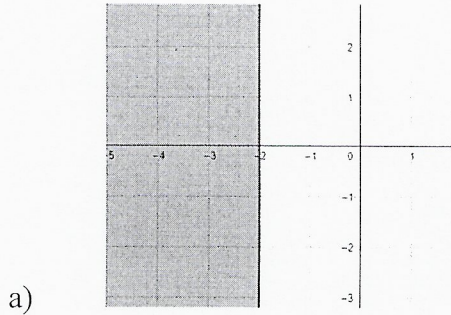
15. $x^2 + 2x + 1$ can be expressed as
- a) $(x + 2)(x + 1)$.
 - b) $(x + 2)(x + 2)$.
 - c) $(x + 1)(x + 1)$.
 - d) $(x + 2x)(x + 1)$.
16. Convert the following to decimal: 101110_2 .
- a) 40
 - b) 52
 - c) 49
 - d) 46
17. What is the binary equivalence of 108?
- a) 1101110_2
 - b) 111110_2
 - c) 1011101_2
 - d) 1101100_2
18. Write 99 in base three.
- a) 10020
 - b) 21000
 - c) 10200
 - d) 00201
19. The gradient of the line $y = -6x + 20$ is
- a) -20.
 - b) 6.
 - c) -6.
 - d) 20.

20. Which of the following represents the solution for the following simultaneous equations?

$$2x + y = 7 \text{ and } -x + y = 1$$



21. Which of the following represents the solution for $5x - 3 \leq 7x + 1$



22. A matrix with a determinant of zero

- a) is a singular matrix.
- b) has no inverse.
- c) is a identity matrix.
- d) is not possible.

23. The determinant of $\begin{bmatrix} -5 & -4 \\ -2 & -3 \end{bmatrix}$ is
- a) 7.
 - b) 14.
 - c) -7.
 - d) -14.
24. The sum of $\begin{bmatrix} 2 & 6 & 3 \\ 4 & 0 & 3 \end{bmatrix} + \begin{bmatrix} -3 & 1 & -3 \\ 2 & -2 & 6 \end{bmatrix}$ is
- a. $\begin{bmatrix} 5 & 7 & 0 \\ 6 & 2 & 3 \end{bmatrix}$.
 - b. $\begin{bmatrix} -1 & 5 & 3 \\ 6 & 2 & 9 \end{bmatrix}$.
 - c. $\begin{bmatrix} -1 & 7 & 0 \\ 6 & -2 & 9 \end{bmatrix}$.
 - d. $\begin{bmatrix} -2 & 6 & 3 \\ 4 & -1 & 3 \end{bmatrix}$.
25. How many times does x^2 divide into x^3y ?
- a) 1
 - b) x^2
 - c) xy
 - d) y
26. If $f(x + 1) = 5x - 2$ find $f(4)$.
- a) 13
 - b) 18
 - c) 23
 - d) $\frac{2}{5}$

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27. If $h(x) = \frac{x^2+3}{4}$, then $h'(x)$ equals

a) $\sqrt{(4x-3)}$.

b) $4x^2 - 3$.

c) $\sqrt{(3x-4)}$.

d) $3x^2 + 4$.

28. For what value of x is $f(x) = \frac{x+9}{x-8}$ undefined?

a) 9

b) -8

c) -9

d) 8

29. If $m * n$ denotes $2m^3 - 3n^2$, determine the exact value of $-1 * 4$.

a) 50

b) 46

c) -46

d) -50

30. If $f = 5$, $g = 6$, $h = -4$ and $i = 2$, find the value of $\frac{hi+2f^2-h+i}{(4g+5h)^2}$.

a) 3

b) 8

c) $\frac{1}{8}$

d) $\frac{1}{4}$

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SECTION B

Answer ALL questions from this section.

1. The area of a rug is 66 square ft. the length of the rug is 5 ft longer than the width. What is the width of the rug? [5 marks]
2. The position of two roads is represented by the equations, $5x + 3y = 25$ and $-3x + 5y = 19$. By using the method of substitution determine the position (x, y) where the two roads intersect. [5 marks]
3. If $f(x) = 3x^2 + 4$ and $g(x) = \frac{(x^2+7)}{x-2}$, find
 - a) $f^{-1}(x)$.
 - b) the value(s) of x for which $g(x)$ is undefined.
 - c) $f^{-1}(g(x))$.
 - d) $f^{-1}(g(3))$. [5 marks]
4. A printer is advertised for sale at J\$84,000. A discount of 12% is given if it is bought for cash. It can also be bought on hire purchase by paying a deposit of J\$29,400 followed by 24 monthly payments of J\$2,300 each. Calculate the
 - a) cash price.
 - b) hire purchase price.
 - c) amount saved by buying the printer for cash rather than on hire purchase. [5 marks]

END OF EXAMINATION