THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

2023 NSL ENTRANCE EXAMINATIONS

MA001 – BASIC MATHEMATICS

For candidates applying for Accounting, Business Management, Applied Economics, Business IT, Communications for Development Studies, Property Studies or Building & Architecture

TIME ALLOWED: 2 HOURS

INFORMATION FOR CANDIDATES

1. Print and sign your name below, and tick a box to indicate the type of course for which you are applying.
2. All answers must be written in this Question Paper.
3. Show all your workings for Section B.
4. Do not use red ink or pencil to write this exam.
5. **Calculators/mobile phones/electronic devices/notes are NOT allowed in the examination room.**

Surname: _____ First name: _____

Signature: _____ Date: _____ Venue: _____

Tick the type of course for which you are applying.

[ ] Bachelors in Commerce in Accountancy
[ ] Bachelors in Commerce in Business Management
[ ] Bachelors in Commerce in Applied Economics
[ ] Bachelors in Commerce in Business IT
[ ] Bachelors in Communications for Development Studies
[ ] Bachelors of Science in Property Studies
[ ] Bachelors in Building & Architecture
[Others] _____

SECTION A – MULTIPLE CHOICE QUESTIONS (68 Marks)

Circle the correct choice. Each question is worth 2 marks.

1. $\sqrt[9]{x^6}$ is equal to

   (a) $\sqrt[2]{x^3}$ (b) $\sqrt[3]{x^2}$ (c) $\sqrt[3]{x}$ (d) $\sqrt[2]{x}$

2. The recurring decimal is exactly equivalent to the fraction

   (a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{9}$ (d) $\frac{1}{11}$

3. If $3^{-x} = \frac{1}{27}$, what is the value of x?

   (a) -2 (b) 2 (c) -3 (d) 3

4. Willai's net pay is K1,200 per fortnight, and his total deduction is K381. What is his gross pay?

   (a) K1,581 (b) K819 (c) K719 (d) K581

5. The product of $1.2 \times 10^{-10} \times 0.6 \times 10^{8}$ is equal to the decimal number

   (a) 0.72 (b) 0.0072 (c) 0.00072 (d) 0.072

6. On a particular day, PGK1.00 (PNG kina) buys US$0.45 (US Dollars). How much is PGK500 in US Dollars?

   (a) 450 (b) 500 (c) 1,111.11 (d) 225

7. What is the logarithm equivalent of the exponential form $e^3 = x$?

   (a) $ln(x) = 3$ (b) $ln(3) = x$ (c) $log(3) = x$ (d) $log(x) = 3$

8. Kambi's hourly pay is K10.50 and his standard number of hours per week is 40. In one particular week he worked 10 overtime hours at the rate of double his normal hourly pay. What is his gross pay during this particular week?

   (a) K210 (b) K420 (c) K630 (d) 530

9. What is the points of intersection for the lines $x - y + 2 = 0$ and $2x + y = 5$?

   (a) $(-3,1)$ (b) $(1,3)$ (c) $(3,-1)$ (d) $(-3,-1)$

10. A plane flies 50 km in 15 minutes. How long does it take to fly 300 km?

(a) 15 mins (b) 30 mins (c) 60 mins (d) 90 mins

11. If the cost of Ox & Palm rises by 1% every month, what will be the cost of Ox & Palm in six months when its current price is K9.50? to be confirmed

(a) K1.06 (b) K11.14 (c) K8.44 (d) K10.08

12. What is $\frac{\pi}{3}$ radians equal to in degrees?

(a) 15^o (b) 30^o (c) 45^o (d) 60^o

13. If the interquartile range is 41 and the lower quartile range is 75, what is the value of the upper quartile range of the data set?

(a) 41 (b) 34 (c) 116 (d) 75

14. A car-hire company charges fixed daily rate of K420 for a Land cruiser, K400 for a bus and K300 for a station wagon. How much will it cost to hire 2 Land cruisers for 5 days, 5 buses for 5 days and 3 station wagons for 10 days?

(a) K4,200 (b) K14,000 (c) K23,200 (d) K18,000

15. What is the solution to the equation $6(x-3) = 24x + 54$?

(a) -2 (b) -4 (c) 2 (d) 4

16. A sum of money is shared between A, N, G and O in the ratio 2: 4: 1: 3 respectively. If N receives K24, how much would O receive?

(a) 12 (b) 18 (c) 21 (d) 24

17. 520 metres is equivalent to

(a) 0.52 km (b) 5,200 cm (c) 5.2 km (d) 52,000 mm

18. A car depreciated at an annual rate of 10%. If the car cost K75,000 when new, how much is the car worth after 4 years? To be confirmed

(a) K25,792.50 (b) K34,807.50 (c) K49,207.50 (d) K109,807.50

19. The next two terms in the following sequence: 2, 8, 18, 32, ... are

(a) 40, 52 (b) 50, 72 (c) 52, 63 (d) 48, 52

20. The expression $\frac{a^3bc^{\frac{1}{2}}}{a^{-2}b^3c}$ when simplified gives

(a) $\frac{a^5}{b^2c^{\frac{1}{2}}}$ (b) $ab^2c^{\frac{1}{2}}$ (c) $\frac{a^2b^2}{c^{\frac{1}{2}}}$ (d) $a^5b^2c^{\frac{1}{2}}$

21. A pmv bus uses 30 litres of diesel to travel 210 km. If diesel costs K3.00 per litre, how much would it cost the bus operator on diesel to travel 300 km? (*Assume fuel consumption rate is constant).*

(a) K50.00 (b) K128.57 (c) K210.00 (d) K90.00

22. If **A** is the set of all prime numbers equal to 20 and **B** is the set of all factors of 18, then which of the following is a member of $\boldsymbol{A} \cap \boldsymbol{B}$?

(a) $\{3\}$ (b) $\{2,3\}$ (c) $\{1,3\}$ (d) $\{1,3,6,9\}$

23. What is the probability of picking a diamond card from a deck of 52 cards?

(a) $\frac{1}{52}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

24. Polu Kambiri imports a car from Japan that costs K10,000. He must pay 20% customs duty fee and 8% of the cost to the clearance agent before he can receive his car. How much will he pay in total?

(a) K4,800 (b) K5,200 (c) K12,800 (d) K8,000

25. If a straight line passes through the points $(2,5)$, $(10,21)$ and $(5,11)$, the equation of this line would be

(a) $2x - 1 + y = 0$ (b) $y + 2x + 1 = 0$ (c) $y - 2x - 1 = 0$ (d) $2x - y - 1 = 0$

26. A company sells lounge chairs at K420 cash, or by 12 equal monthly installments, where the interest rate is calculated at 12% p.a. flat. What is the amount of each installment?

(a) K25.50 (b) K42.30 (c) K39.20 (d) K35.50

27. Find the amount to which K250 will grow if it is invested for four years at 12% p.a. interest compounded half-yearly.

(a) K350 (b) K250 (c) K280 (d) K380

28. How many solution(s) does the equation $3u^2 + 36u = -105$ has?

(a) None (0) (b) 1 (c) 2 (d) 3

29. If $\frac{1}{8^{2y+1}} = 0.25$, what is the value for y ?

(a) $\frac{1}{3}$ (b) $-\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $-\frac{1}{6}$

30. If 30% of a certain length is 600 mm, what would be the complete length?

(a) 2 mm (b) 20 mm (c) 200 mm (d) 2,000 mm

31. A regular square field has an area of 25 square meters. What is the perimeter of this regular square field?

(a) 15m (b) 20m (c) 25m (d) 50m

32. The IQ test marks for 8 students are 10, 25, 11, 9, 21, 23, 15, 17. What is the median score?

(a) 15 (b) 16 (c) 17 (d) 18

33. Add $5\frac{1}{2} + 4\frac{1}{3} + 3\frac{1}{4}$

(a) $\frac{157}{12}$ (b) $\frac{32}{8}$ (c) $\frac{120}{12}$ (d) $\frac{17}{2}$

34. If three-quarter of an unknown number is subtracted from $\frac{23}{10}$, the answer is two-fifth of the unknown number. What is the unknown number?

(a) 2 (b) 3 (c) 4 (d) 4.5

SECTION B – CALCULATION QUESTIONS (20 Marks)

For questions 35 to 38, show all calculations. Marks will be awarded for correct working out. Each question is worth 5 marks.

35. A student bought some maths books and some computing books at a bookstore for K230. The maths books cost K15 each and the computing books cost K25 each. If he bought 12 books, how many of each type books did he buy?

36. The universal set is $\varepsilon = \{a, b, c, d, e\}$, $\boldsymbol{P}$ is the subset $\{a, b, d, e\}$ and $\boldsymbol{Q}$ is the subset $\{c, d, e\}$. What is the set $\boldsymbol{P} \cap \boldsymbol{Q}'$?