

BENDEMEER SECONDARY SCHOOL 2024 PRELIMINARY EXAMINATION SECONDARY FOUR NORMAL (ACADEMIC)

CANDIDATE NAME

CLASS

INDEX NUMBER

MATHEMATICS (SYLLABUS A)

Paper 1

30 July 2024 2 Hours

4045/01

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, register number on all the work you hand in. You may use an HB pencil for any diagrams or graphs. Do not use staples, paper clips, glue or correction fluid. The use of an approved scientific calculator is expected, where appropriate.

Answer **all** the questions.

The number of marks is given in brackets [] at the end of each question or part question.

If working is needed for any question, it must be shown with the answer. Omission of essential working will result in loss of marks. The total of the marks for this paper is 70.

The use of an approved scientific calculator is expected, where appropriate. If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place. For π , use either your calculator value or 3.142.



Mathematical Formulae

Compound interest

Total amount = $P\left(1 + \frac{r}{100}\right)^n$

Mensuration

Curved Surface area of a cone = πrl Surface area of a sphere = $4\pi r^2$ Volume of a cone = $\frac{1}{3}\pi r^2 h$ Volume of a sphere = $\frac{4}{3}\pi r^3$ Area of triangle $ABC = \frac{1}{2}absin C$ Arc length = $r\theta$, where θ is in radians Sector area = $\frac{1}{2}r^2\theta$, where θ is in radians

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a^{2} = b^{2} + c^{2} - 2bc \cos A$$

Statistics

$$Mean = \frac{\sum fx}{\sum f}$$

Standard deviation =
$$\sqrt{\frac{\Sigma f x^2}{\Sigma f} - \left(\frac{\Sigma f x}{\Sigma f}\right)^2}$$

1 (a) Simplify
$$\frac{6x^2y}{8xy^3}$$
.

[1] Answer

(b) Simplify
$$\left(\frac{x^3}{27}\right)^{-\frac{1}{3}}$$
.

[2] Answer

The diagram below shows a solution set for x on a number line. 2



Write down the range of values of *x*. **(a)**

> Answer [1]

If *x* is an integer, state the largest value of *x*. **(b)**

[1]

3 In a sale, the price of a handphone is reduced from \$388 to \$302. Calculate the percentage decrease in price.

Answer% [2]

4 The angles in a triangle are in the ratio 3:4:5. Calculate the size of each angle in degrees. 5 The diagram shows a regular hexagon *ABCDEF*. *AB* and *DC* are produced to meet at *G*.



Find angle BGC.

Answer° [2]

6 Use a scale factor of $\frac{2}{3}$ to draw a reduction of the given figure.

l I		I		l I							

[2]

[TURN OVER

7 (a) Solve
$$\frac{x}{x+3} = 24$$
.

(b) Given that $\frac{5^7 \times 5^{-2}}{5^4} = 5^a$, find the value of *a*.

8 Triangles *ABC* and *DEC* are similar. All the lengths are in centimetres.



(a) Calculate *x*.

(b) Find y in terms of z.

4045 Paper 1/ Sec Four NA / Prelim Exam / BDMS 2024 [TURN OVER

- 9 The first four terms of a sequence are 5, 9, 13 and 17.
 - (i) Find an expression, in terms of n, for the n^{th} term of the sequence.

(ii) Find the 25th term of the sequence.

(iii) Jane says that 212 is a term in this sequence. Is she correct? Explain your answer.

- 10 A map is drawn to scale of 1: 25 000.
 - (a) The distance on the map between the school and Mary's house is 4 cm.Find the actual distance, giving your answer in kilometres.

Answerkm [2]

(b) The area of the playground is 75 000 m².
Calculate the area of the playground on the map. Give your answer in cm².

11 (a) Write 90 as the product of its prime factors.

(b) Find the highest common factor (HCF) of 90 and 216.

(c) Find the smallest positive integer value of k such that 90k is a perfect square.

Answer k = [1]

4045 Paper 1/ Sec Four NA / Prelim Exam / BDMS 2024

12 **(a)** Ahmad invested \$4500 for 2 years in a savings account of Bank Prosper. He was paid 4 % per annum compound interest. How much did Ahmad have in his savings account after 2 years?

> Answer \$..... [2]

(b) Ahmad invested another \$4500 for 2 years in an endowment fund of Bank Wealthy. The fund pays an interest rate compounded yearly. At the end of 2 years, he received a total of \$5100. Find the interest rate per annum.

(b) Solve
$$\frac{11}{x+7} - \frac{2}{x^2 - 49} = 1.$$

You must show all your working clearly.

Answer $x = \dots$ [4]





[TURN OVER

15 The table below shows the distance of some of the asteroids from earth in 2024.

Name of asteroids	Distance from earth (km)
2024 GM	7,160,000
2024 HS	7,450,000
2021 VH2	3,560,000
2024 HD	2,260,000

(a) State the distance from earth of 2024 GM in standard form.

Answerkm [1]

(b) What is the distance between 2024 HS and 2021 VH2? Give your answer in million.

Answermillion [2]

(c) The distance between Earth and the moon is about one fifth of the distance between Earth and 2024 HD. Estimate the distance between Earth and the moon, in standard form.

Answerkm [2]

- 16 The points *A* and *B* have coordinates (-3, 4) and (1, 8) respectively.
 - (i) Calculate the length of *AB*.

(ii) Find the equation of the line *AB*.

(iii) Find the coordinates of the point where the line AB cuts the line y = 9.

Answer (...... ,) [1]

17 Jamal plans to rent a candy floss machine for a class event. The graph shows the rental costs from Company A.



Hours of Rental

(a) How much should she expect to spend if she rent the candy floss machine from 8am to 12.30pm?

Answer \$..... [1]

- (b) Jamal found Company B who rents candy floss machine with a flat rate of \$10 and an additional rate of 25 cents per minute.
 - (i) Convert 25 cents per minute to dollar per hour.

Answer \$.....per hour [1]

(ii) Draw the graph of Company B's rental rates for the 1st two hours on the same [1] axes as above.

(iii) From the graph, how long should Jamal rent the candy floss machine for her to be paying the same amount of rental from both Companies.

Answerhour [1]

18 (a) Given that $x^2 + 4x - 3 = (x + a)^2 + b$, find a and b, such that a and b are integers.

(b) Hence, solve $x^2 + 4x - 3 = 0$, giving your answers correct to 2 decimal places.

19 The diagram below shows a prism. Three of its faces are rectangles. All lengths are given in centimetres.



(a) Show that x is 5 cm.

(b) Calculate the **total** surface area of the prism.

[2]

4045 Paper 1/ Sec Four NA / Prelim Exam / BDMS 2024

20 A solid is formed by removing a cone of radius *r* cm from the top of a cylinder of radius *r* cm. The height of cylinder is thrice the height of the cone, *h* cm. The total volume of the solid is $533\frac{1}{3}\pi$ cm³.



Calculate the exact value of *r*.

BLANK PAGE