ZIMBABWE

MINISTRY OF HIGHER AND TERTIARY EDUCATION, INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT

HIGHER EDUCATION EXAMINATIONS COUNCIL (HEXCO)

NATIONAL CERTIFICATE

IN

WOOD TECHNOLOGY (MACHINING AND MANUFACTURING)

MODULE: Engineering Mathematics **PAPER NO:** 370/19/S10

DURATION: 3 Hours

NOVEMBER/DECEMBER 2025 EXAMINATION

REQUIREMENTS

1) Booklet
2) Scientific calculator

INSTRUCTIONS TO CANDIDATE

1) Answer all questions in section A and any four (4) questions in section B.
2) Show all your working.
3) Section A carries 40 marks and section B carries 60 marks.

This paper consists of 5 printed pages.

SECTION A

QUESTION 1

a) Express the following in standard form:

i) 0,0000063 (2 marks)

ii) 0,000001 (2 marks)

b) i) Simplify $(x^2)^3$ (1 mark)

ii) $(-3d^3)^2$ (2 marks)

QUESTION 2

Solve

a) $x^{1/3} = 4$ (2 marks)

b) $2\,a^{-\frac{1}{2}} = -14$ (2 marks)

QUESTION 3

a) Solve the following equations:

i) $8n - (5n + 13) = 7$ (2 marks)

ii) $\frac{3x}{4} - \frac{5}{3} = \frac{2x}{3}$ (3 marks)

b) i) Make x the subject of the formula

$a=\frac{b+x}{b-x}$ (3 marks)

ii) A bonus is paid to 4 men in the ratio 9:11:13:15 if the total bonus is 240. Find how much each receives. (4 marks)

QUESTION 4

State the formula for the shapes below:

a) sphere (2 marks)

b) cone (2 marks)

c) cylinder (2 marks)

d) pyramid (2 marks)

QUESTION 5

a) Find the value of x *and* y shown in fig 1 below. (4 marks)

b) Find the number of floor tiles measuring 400mm× 400mm each needed for a floor 15m long and 8m wide. (3 marks)

c) Find the value of $\pi\sqrt{\frac{l}{g}}$

When $\pi = 3.14\ l = 98\ and\ g = 32$) (2 marks)

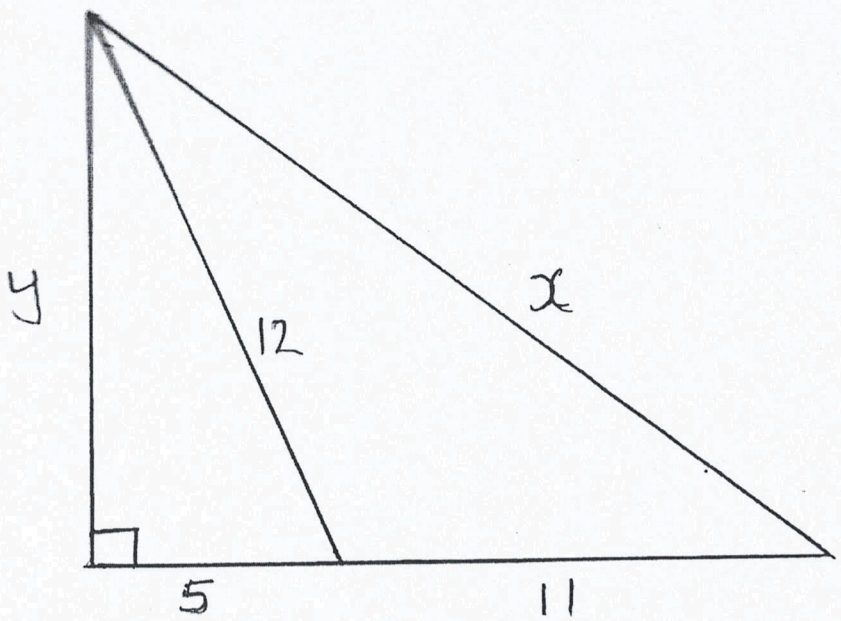

Fig 1

SECTION B (ANSWER ANY FOUR (4) QUESTIONS)

QUESTION 6

a) An open rectangular box measures iexternally 32cm long, 27cm wide and 15cm depth. If the box is made of wood 1cm thick. Calculate volume of wood used. (5 marks)

b) Find capacity in litres of a bucket 24cm in diameter at the top, 16cm in diameter at the bottom and 18cm deep. (8 marks)

c) Reduce $\frac{6m^2u^2-4mu^3}{9m^3u-4mu^3}$ (2 marks)

QUESTION 7

a) Find the appropriate length in metres for a band saw to fit a machine having wheels of 762mm diameter and a centre distance (allowing for strain) of 1.5m. (5 marks)

b) A village P is 10km from a point x. Another village Q is 6km from x on a bearing of 162°. Calculate the distance and bearing of P from Q. (10 marks)

QUESTION 8

a) Solve the simultaneous iequation

$$\frac{1}{2}x+\frac{1}{3}y=4$$

$$\frac{1}{4}y-\frac{1}{3}x=\frac{1}{6}$$ (5 marks)

b) A plan is made of a school, it is found that the length of the laboratory is 15,6m is represented on the plan, by a line 7,8cm long. Find the scale of the plan in the form 1:n. (4 marks)

c) Simplify $-3(d^3)^2$ (2 marks)

d) Simplify

$$\frac{3}{m^2+mn-2n^2}-\frac{2}{m^2-4mn+3n^2}$$ (4 marks)

QUESTION 9

a) A rectangular room measuring 3.2m by 4m is to be floored with tongued and grooved boards and the cost is \$5,70 per m^2. calculate

i) The amount if flooring to be ordered allowing 10% wastage. (Correct to one decimal place). (4 marks)

ii) The total cost of the flooring. (2 marks)

b) What is the principal sum which must be invested in a joinery business at a guaranteed rate of interest if 7,5% per annum in order to obtain a total income from interest of $1200-00 per annum. (4 marks)

c) Simplify $\frac{(x+2)^{-\frac{1}{2}}+2(x+2)^{3/2}}{x+2}$ (5 marks)

QUESTION 10

a) Compare the peripheral speed of a circular cutter block of 100mm diameter that runs at 5000 rev/min, with that of a 20mm diameter router cutter running at 24000 rev/min. Sp=$\frac{\pi DR}{1000}$

Where Sp=peripheral speed
$\pi = 3.14$
D=Diameter of cutter
R=No of rev per minute (8 marks)

b) i) Calculate the rise of a roof given that the roof span is 6.5m and pitch of 30°. (4 marks)

ii) Calculate the length of the rafter using the information above in b(i). (3 marks)

...../fk