

Marine Engineering Class – 3 / 4

Mathematics Mock Test

Date: 23rd Sept 2019

Time: 0830 hours

Time Allowed: 1 hour 30 minutes (5 minutes extra for reading the examination paper)

Passing Marks: 24 out of 40

Weighting: 50% of final mathematics grade

Instructions:

- 1) Do not start writing until you are told to do so by the Supervisor
- 2) Candidates may bring drawing instruments and non-programmable calculators to the examination.
- 3) All written answers must be in ink.
- 4) Drawings can be done in pencil.
- 5) ALL working must be shown for full marks to be given.
- 6) Answer all questions.

NO CELLPHONES ARE PERMITTED IN THE EXAMINATION ROOM

Question 1

10 marks

- a) A storage tank has a capacity for 57 tonnes of fuel oil. Initially $\frac{2}{3}$ of the tank is loaded then $\frac{1}{6}$ of this fuel oil is consumed. A further $\frac{3}{5}$ of the remaining fuel is then transferred to a settling tank. Calculate the amount of fuel oil loaded and fuel oil remaining in the storage tank after transfer to the settling tank

Show all of your working and round all answers to 1 d.p

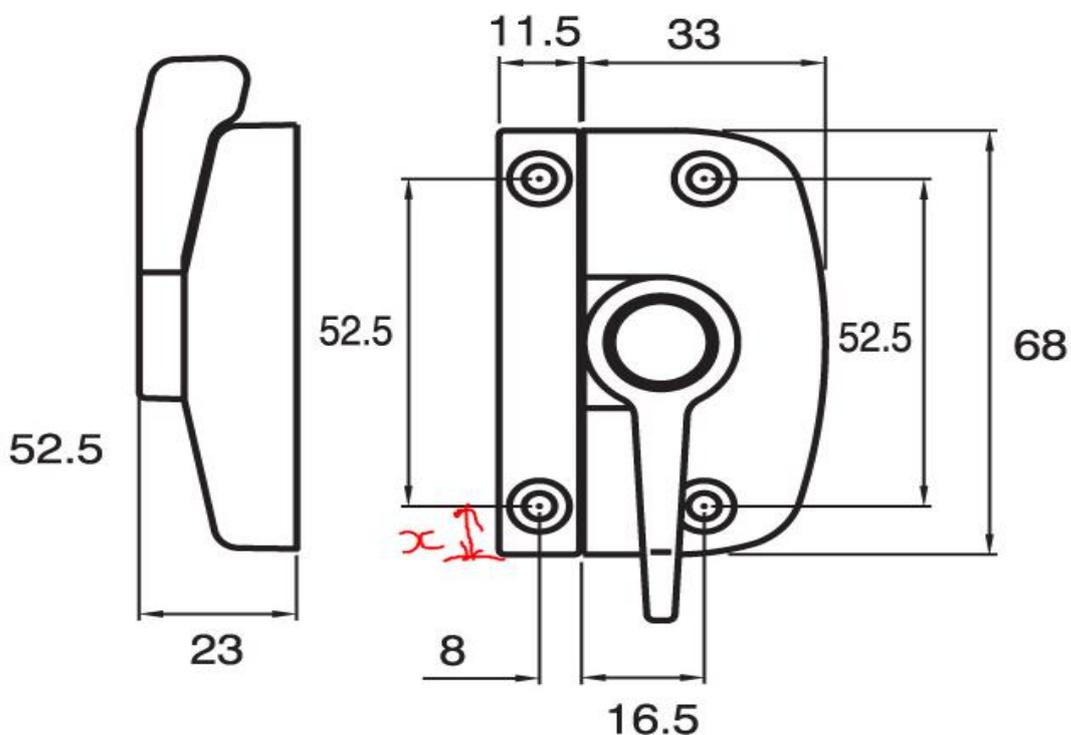
(6 marks)

- a) Chef Rita is cooking for a Sunday brunch. She knows that 22 pancakes can feed 8 people. Determine how many people she can feed with 55 pancakes. She assumes each person eats the same quantity of pancakes. (4 marks)

Question 2

2 marks

Determine the missing dimension (x) the distance from the centre of the hole to the edge shown below. Correct your answer to 2 significant figures.



Question 3**3 marks**

Evaluate in engineering form correct to 4 significant figures

$$\frac{86.2 \times 10^{11} \times 0.064 \times 10^4 \times 95.4 \times 10^{-5}}{4.3 \times 10^{-3} \times 0.65 \times 10^6}$$

Question 4**5 marks**

Write these values using the correct SI prefix

- a) 0.00006945 F where F is Farads
- b) $0.042 \times 10^7 \Omega$ where Ω is Ohm's
- c) 8.23×10^5 N where N is Newton's
- d) 791,000 W where W is Watts
- e) 0.000068 H where H is Henry

Question 5**5 marks**

Find the value of x in the following equation, round your answer to 2 decimal places:

$$25x + 72 - 4x = 3x + 16 + 12x$$

Question 6**3 marks**

Expand

$$(10x - 5)(2x - 8)$$

Question 7**6 marks**

The inside diameter ‘d’ of a hollow shaft when subjected to a torsion ‘T’ is given by,

$$d = \sqrt[4]{D^4 - \frac{16TD}{\pi q}}$$

Where, $D = 0.35$ m;

$T = 400$ K-Nm where K-Nm is Kilo-Newton Metre

$q = 110$ M-N/m² where M-N/m² is Mega Newton per square metre

Find the diameter “d” correct to 4 decimal places.

Question 8**6 marks**

(a) The surface area of a closed cylinder is given by the equation,

$$A = 2\pi r^2 + 2\pi rh,$$

Transpose this equation to find ‘h’(3 marks)

(b) In the above equation, calculate the value of ‘h’ correct to 2 decimal places when

$$A = 10 \text{ m}^2,$$

Radius, $r = 500$ mm(3 marks)