Multi Mark 1

1.

You will be assessed on the quality of your written communication in this question.

A colour of paint called 'ochra' is made using a recipe with white, red, blue and yellow paint. The breakdown of the percentages of the different colours in the 'ochra' paint are shown in the table.

'Ochra' paint recipe	
White	90%
Red	5%
Blue	3%
Yellow	2%

Catrin has already bought 2·5 litres of blue paint.
She decides to buy white, red and yellow paint to use with **all** of her blue paint to make as much 'ochra' paint as she can.

The sizes of tins of paint available are:

- 1 litre,
- 2·5 litres and
- 10 litres.

Only full tins of paint are available to buy.
Catrin has only a small shed to store her paint, so wants as little white, red and yellow paint left over as possible.

Calculate the amount of each of the colours of paint Catrin needs to buy and complete the shopping list for her on the opposite page.
You **must** show all your working.

2·5 litres = 3%

$\frac{2.5}{3}$ = 1% = $0.8\dot{3}$ litres

white $0.8\dot{3} \times 90 = 75$ litres → $7 \times 10l$ $2 \times 2.5l$

red $0.8\dot{3} \times 5 = 4.1\dot{6}$ litres → $1 \times 2.5l$ $2 \times 1l$

yellow $0.83 \times 2 = 1.6$ litres → $2 \times 1l$

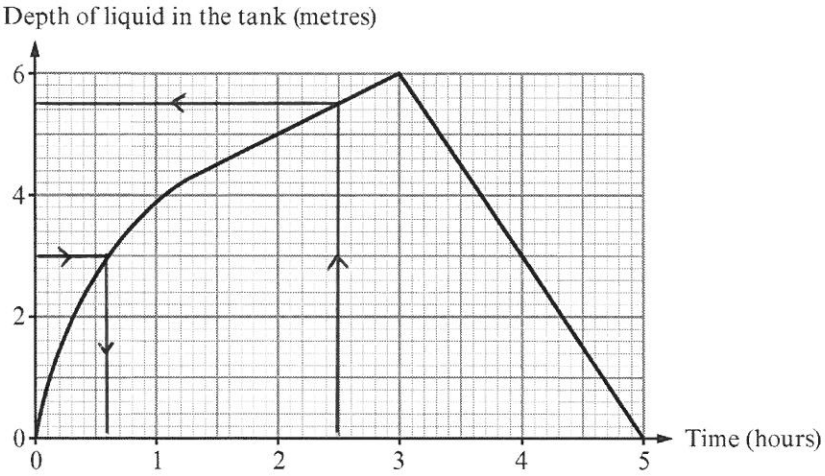
2.

A chemical factory makes a liquid that is used in the production of a waterproof fabric.
A cylindrical tank is used to collect the liquid made in the factory.

The moment the tank is full, it starts to empty the liquid into a tanker in readiness for delivery to a company which makes the waterproof fabric.

This process is continuous during the week, but the production stops at weekends for maintenance.

The graph shows the process of the tank being filled and emptied into the tanker.



(a) What is the depth of the liquid in the tank $2\frac{1}{2}$ hours into the process?

5.5 metres

[1]

(b) How long, in minutes, does it take to half fill the cylindrical tank?

0 - 1hr = 10 squares

6 mins = 1 square

6 x 6 = 36minutes

[2]

(c) The tank is left empty over the weekend.
The continuous process starts each Monday at 07:00 by filling the tank.
This process of filling and emptying the tank continues until shutdown on Friday.

(i) Explain what is happening at 20:00 on Monday, giving the depth of the liquid in the tank.

07.00 → 20.00 is 13 hours

2 x 5-hour cycles completed

at 20.00 it's 3 hours into the cycle

↳ tank is 6m full so is about to start emptying

[3]

(ii) *You will be assessed on the quality of your written communication in this part of the question.*

The process has to shut down with the tank empty as soon after, but not before, 19:00 on a Friday. At what time should the process shut down on a Friday?
You must show all your working.

Mon 07.00 → Fri 07.00 = 5 x 24 hours = 120 hours

Fri 07.00 → Fri 19.00 = 12 hours

120 + 12 hours = 132 hours

Full cycle every 5 hours which would be 130 hours

↳ this is 2 hours before Fri 19.00 = 17.00

17.00 plus full cycle = 22.00 on Friday

[6]