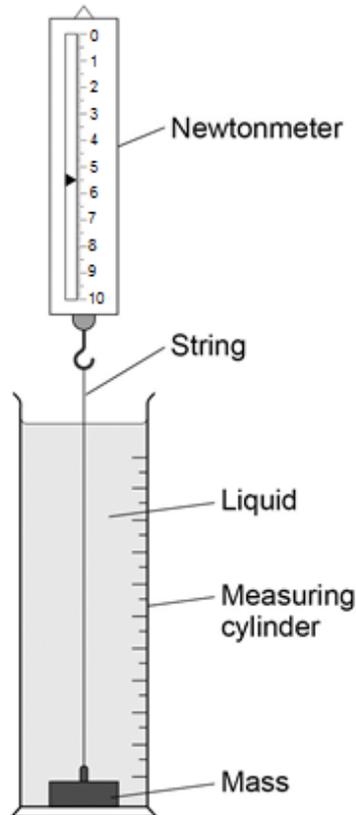| 0 | 3 | A student investigated the force needed to raise a mass through different liquids at a constant speed.

She set up the apparatus shown in **Figure 5**.

**Figure 5**



| 0 | 3 | . | 1 | In the investigation there are several variables.

Draw **one** line from each variable to the correct description for this investigation.

**[3 marks]**

| Variable | Description |
| --- | --- |
| | Distance the mass was lifted |
| Control | |
| | Value of force on the newtonmeter |
| Dependent | |
| | Mass |
| Independent | |
| | Type of liquid |

**Table 2** shows the student's results.

**Table 2**

| Liquid | Force in N |
|--------|------------|
| Water | 10.0 |
| Washing up liquid | 11.1 |
| Glycerol | 11.5 |
| Syrup | 13.8 |

**0 3 . 2** What was the resolution of the newtonmeter?

Tick **one** box.

**[1 mark]**

0.1 N ☐

0.5 N ☐

1 N ☐

10 N ☐

**Question 3 continues on the next page**

**Turn over ▶**

| 0 | 3 | . | 3 | The student wanted to display her results.

How should she display her results?

**[1 mark]**

Tick **one** box.

A bar chart ☐

A line graph ☐

A pie chart ☐


| 0 | 3 | . | 4 | Give a reason for your answer to part **03.3**.

**[1 mark]**

_____

_____


| 0 | 3 | . | 5 | A force of 13.8 N was used to lift the mass 30 cm vertically through the liquid.

Use the following equation to calculate the work done in lifting the mass.

Work done $=$ force $\times$ distance

Choose the correct unit from the box.

**[3 marks]**

| J | m/s | N |
|---|---|---|

_____

_____

_____

Work done = _____

Unit = _____

**Question 3**

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|---|---|---|---|---|
| **03.1** |  | allow **one** mark for each correct line<br><br>if more than one line is drawn from any variable then all of those lines are wrong | 1<br><br>1<br><br>1 | AO3/3a<br><br>AO2/2<br><br>AO2/2<br>6.5.1.2<br>WS2.2, 4.1 |
| **03.2** | 0.1 N | if more than **one** box ticked apply list principle | 1 | AO2/2<br>6.5.1.2<br>WS2.3 |
| **03.3** | A bar chart | if more than **one** box ticked apply list principle | 1 | AO2/2<br>6.5.1.2<br>WS3.1 |
| **03.4** | some of the data is categoric | | 1 | AO2/2<br>6.5.1.2<br>WS3.1 |
| **03.5** | 13.8 × 0.30<br><br>4.14<br><br>J | allow 4.14 without working shown for **2** marks | 1<br><br>1<br><br>1 | AO2/1<br><br>AO2/1<br><br>AO1/1<br>6.5.2<br>WS4.3 |
| **Total** | | | **9** | |