AS and A-level Physics: Answers to activities in the Transition guide

You can find answers to the activities in the Transition guide in the tables below. Activities 1 and 5 are based on your own personal experience and research and so there are no answers given to these sections.

Activity 2
1. cm
2. K
3. s / ms
4. nm / pm
5. mg / μg
6. A

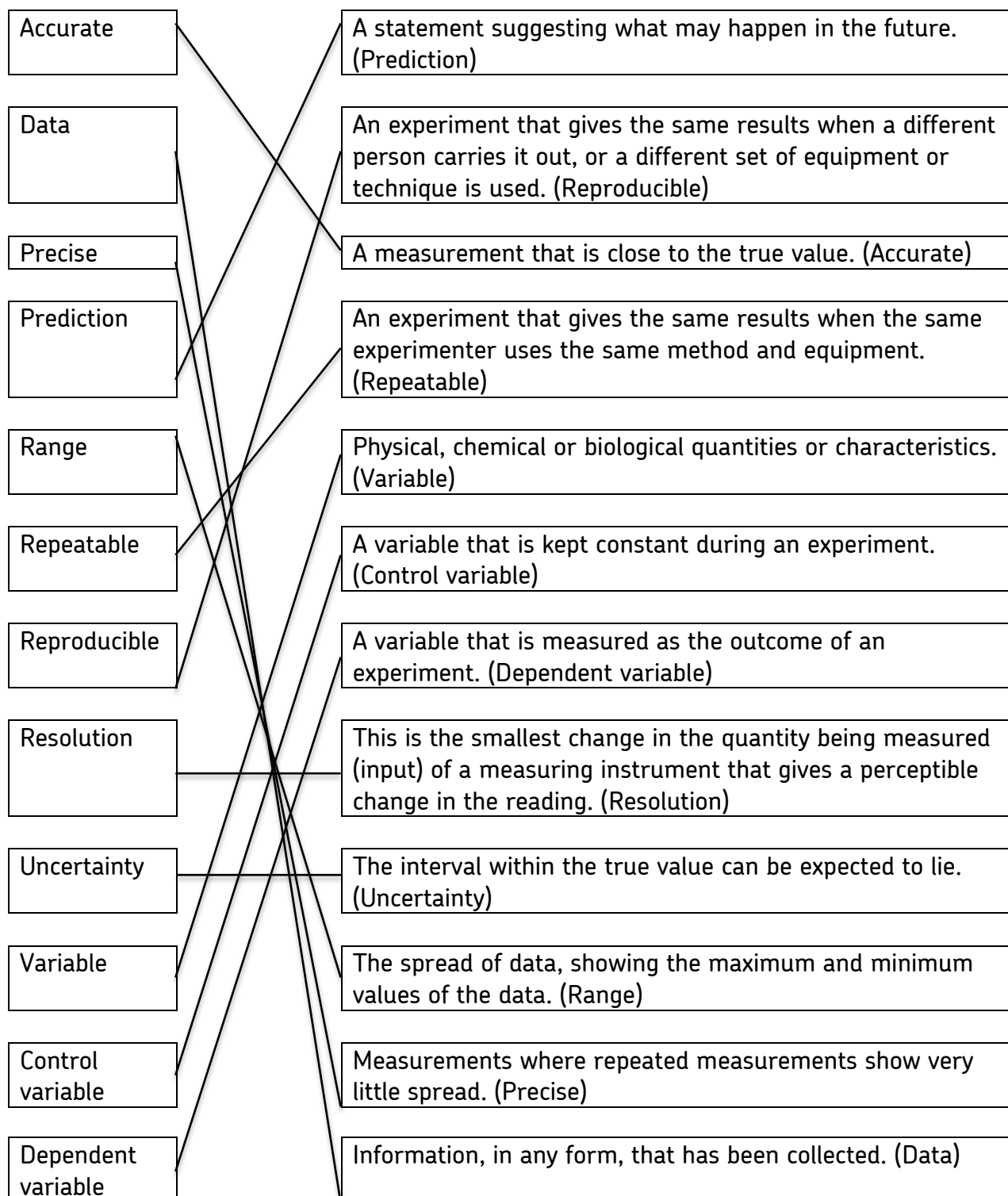| Activity 3 |
| --- |
| 1. 60 seconds |
| 2. 2600 seconds |
| 3. 1000 kg |

Activity 4

Re-write the following quantities.

1. 1.502 kilometres
2. 450 micrograms
3. 0.45 millimetres
4. 1 055 000 metres
5. 180 000 000 seconds
6. 25 000 millimetres

Activity 6

Join the boxes to link the word to its definition.

Word	Definition
Accurate	A statement suggesting what may happen in the future. (Prediction)
Data	An experiment that gives the same results when a different person carries it out, or a different set of equipment or technique is used. (Reproducible)
Precise	A measurement that is close to the true value. (Accurate)
Prediction	An experiment that gives the same results when the same experimenter uses the same method and equipment. (Repeatable)
Range	Physical, chemical or biological quantities or characteristics. (Variable)
Repeatable	A variable that is kept constant during an experiment. (Control variable)
Reproducible	A variable that is measured as the outcome of an experiment. (Dependent variable)
Resolution	This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading. (Resolution)
Uncertainty	The interval within the true value can be expected to lie. (Uncertainty)
Variable	The spread of data, showing the maximum and minimum values of the data. (Range)
Control variable	Measurements where repeated measurements show very little spread. (Precise)
Dependent variable	Information, in any form, that has been collected. (Data)

Activity 7: Standard form

1. Standard form

    (a) 3.794×10^2

    (b) 7.12×10^{-2}

2. Ordinary numbers (use the data sheet on the last page of this booklet):

    (a) $300\,000\,000 \text{ ms}^{-1}$

    (b) $0.000\,000\,000\,000\,000\,0016\text{C}$

3. 2.5×10^5

4. proton rest mass; permeability of free space; acceleration due to gravity; the Avogadro constant; mass of the Sun.

5. 1.52×10^{-55}

6. 6×10^1

Activity 8: Decimal places, significant figures and rounding

1. 5 rockets

2. 35.7%

3. 300 beta particles

Activity 9: Fractions, ratios and percentages

1. 1/20

2. 50 diodes

3. The second pile (250:300)

4. 5.44 cm^2

5. 20 cubes

6. 10 faulty components altogether (9 resistors and 1 capacitor)

7. 127 400 metres or 127.4 km

8. Power Station B was offline for longer.

    Power station A = online 7050 days, offline 450 days.

    Power station B = online 8640 days, offline 1080 days.

Activity 10: Use sine, cosine and tangent

1   (a)   2.5 cm.

     (b)   4.3 cm

Activity 11: Pythagoras's theorem

First drawing = 5.4 cm

Second drawing = 6.0 cm

Activity 12: Arithmetic means

1.   89 kg

2.   12.5 seconds

Activity 13: Rearranging formulas

1. $x = (y - 3) / 2$

2. $r = C / 2\pi$

3. $v = \sqrt{(2E / m)}$

4. $u = (s - \frac{1}{2} at^2) / t$

5. $a = 2 (s - ut) / t^2$

6. $r = \dfrac{v}{\omega}$

7. $r = (4 \pi^2 v) / T^2$

8. $x = \sqrt{(A^2 - (v^2 / \omega^2))}$

9. $m_2 = Fr^2 / Gm_1$

10. $r = \sqrt{(Gm_1m_2 / F)}$

Activity 14: Graphs

1. See graph for line of $C = 8d + 10$

2. £10

3. No, Josh is wrong. After 5 days the second supplier is cheaper. This is because the reduced cost of hire each day pays back the difference in initial hire cost after 5 days.
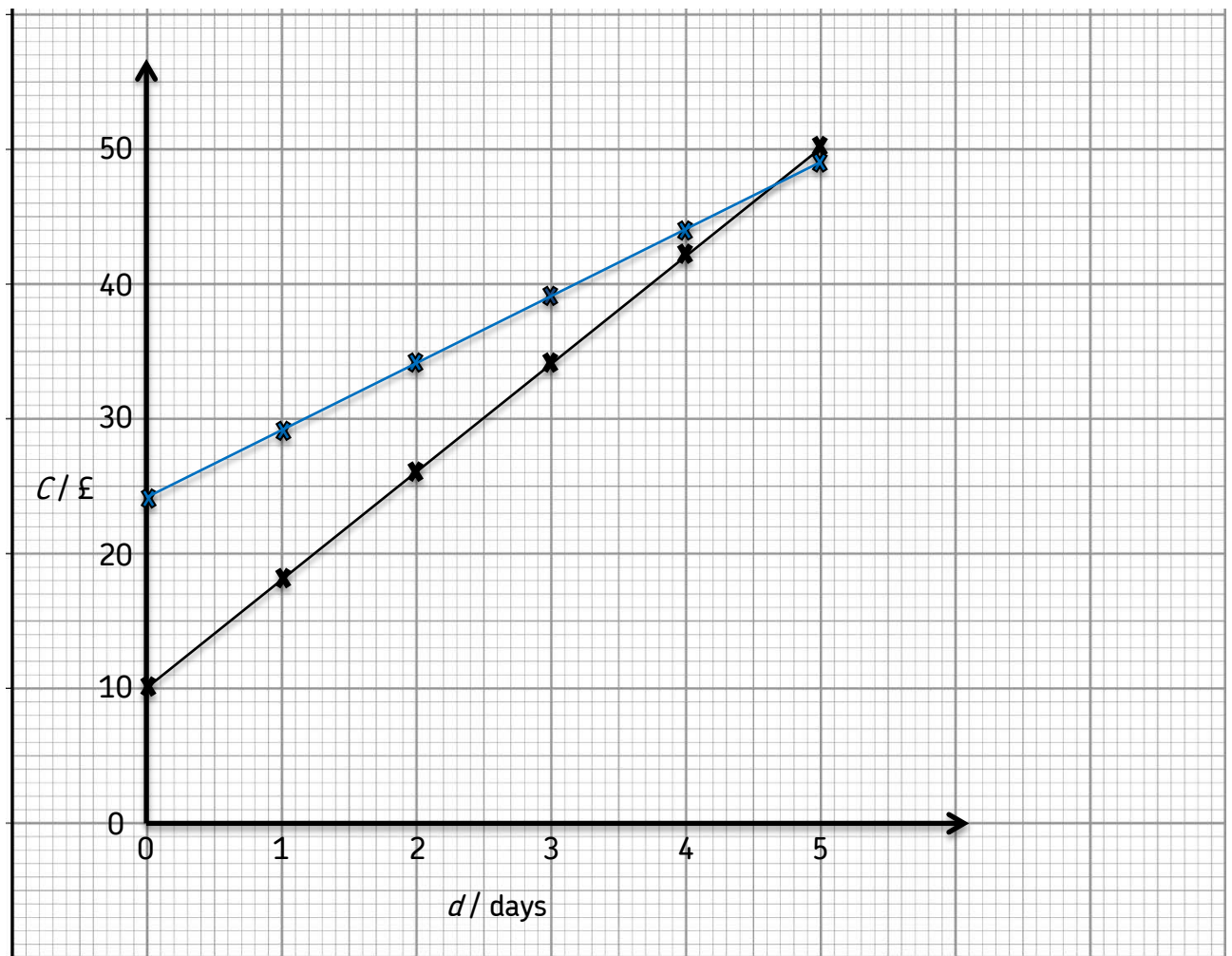
4.   The cost for 6 days is £100

5.   The second company, as the total cost after 5 days is less due to the lower daily rate of hire from day 3 onwards and the lower initial hire cost.
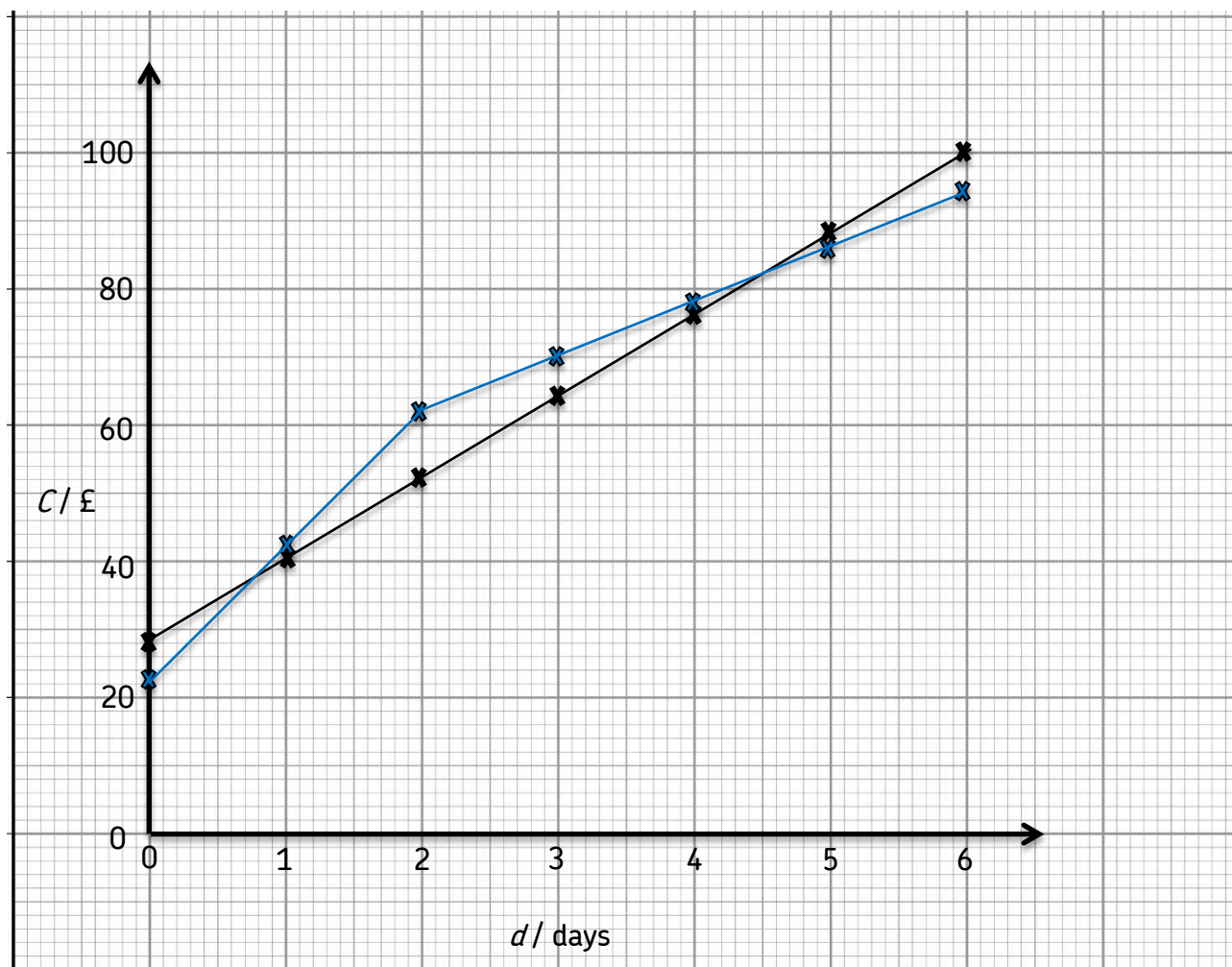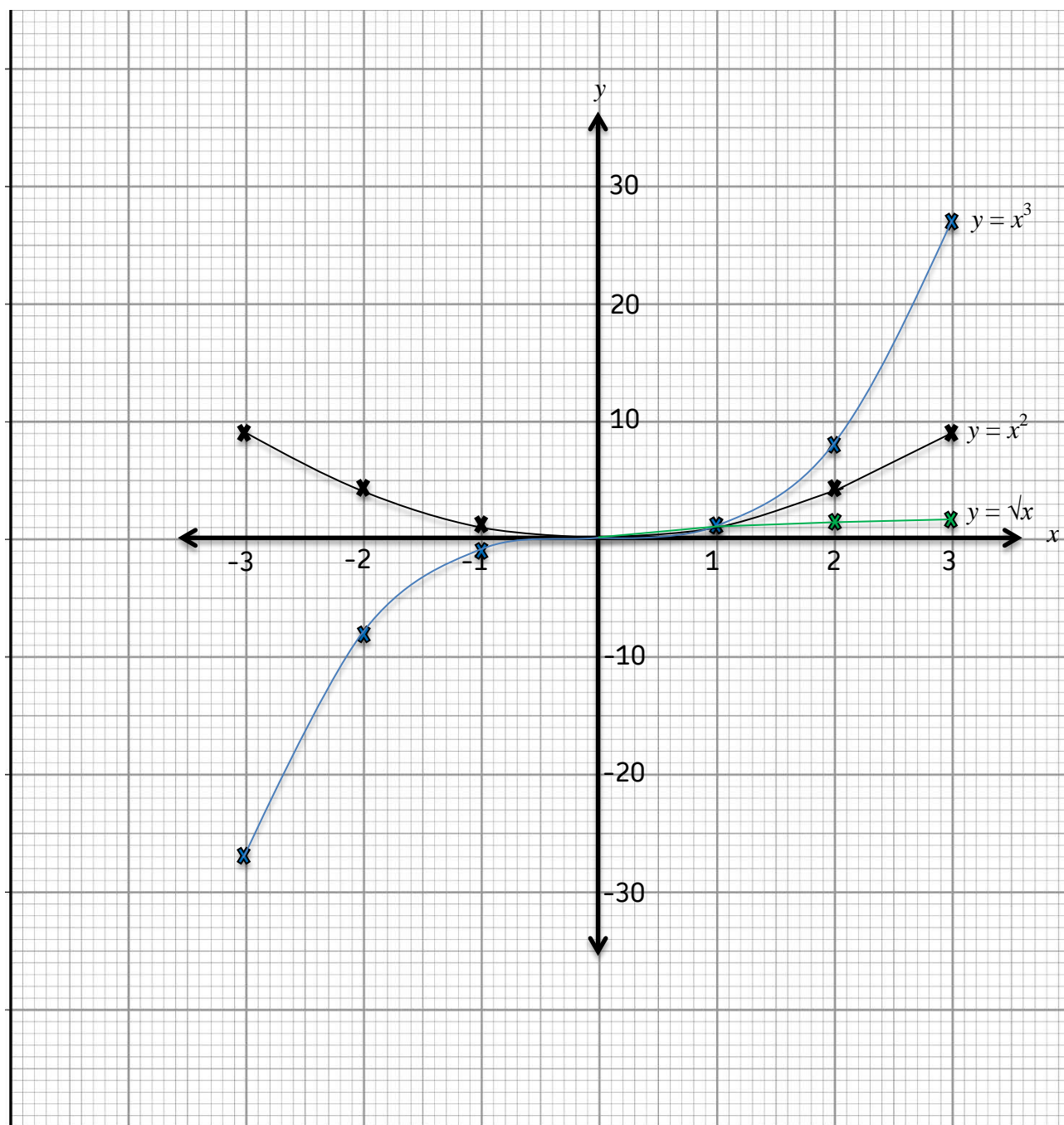
6. Draw graphs of the following functions from $x = -3$ to $x = +3$.

    Choose axes that allow all values of all graphs to be shown.

    $y = x^2$, $y = x^3$ and $y = \sqrt{(x)}$ for positive numbers only

Activity 15: Gradients and areas

1. Area $= 625 = \frac{1}{2}(20 + 50) \, x \, v$, so $v = 17.9 \text{ ms}^{-1}$

2. Area $= \frac{1}{2}(20 + 50) \, x \, 50 = 1750 \text{ m}$

Activity 16: Non-linear graphs

a. 6 ms^{-1}

b. answer between 20 to 25 m

c. $20 / 7.5 = 2.7 \text{ ms}^{-1}$ to $25 / 7.5 = 3.3 \text{ ms}^{-1}$

d. 0 ms^{-2}