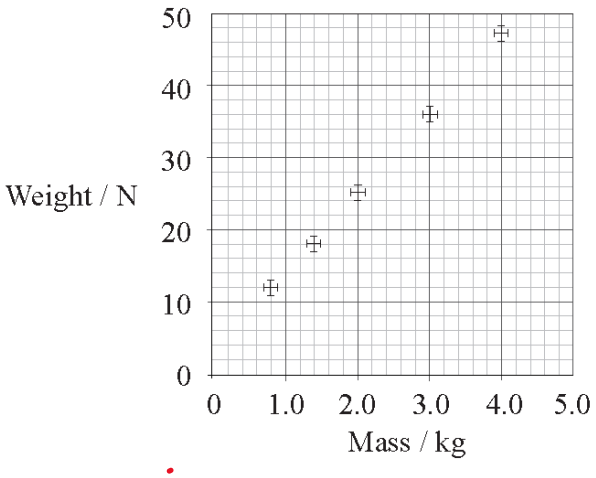
The masses and weights of different objects are independently measured. The graph is a plot of weight versus mass that includes error bars.



These experimental results suggest that

A. the measurements show a significant systematic error but small random error.

B. the measurements show a significant random error but small systematic error.

C. the measurements are precise but not accurate.

D. the weight of an object is proportional to its mass.

Which of the following is a valid statement?

A. A measurement that is not precise can be accurate.

B. A measurement that is precise is always accurate.

C. A measurement that is not precise will always be inaccurate.

D. Repeated measurements will always increase accuracy and precision.

In an experiment to measure the acceleration of free fall at the surface of the Earth the following results were obtained.

Acceleration of free fall / $m\,s^{-2}$
7.69
7.70
7.69
7.68
7.70

The results are

A. accurate and precise.

B. inaccurate but precise.

C. accurate but imprecise.

D. inaccurate and imprecise.

The length of each side of a sugar cube is measured as 10 mm with an uncertainty of ± 2 mm. Which of the following is the absolute uncertainty in the volume of the sugar cube?

A. $\pm 6\,mm^3$

B. $\pm 8\,mm^3$

C. $\pm 400\,mm^3$

D. $\pm 600\,mm^3$

$V = (10 \pm 2)^3$

$\frac{2}{10} \cdot 3 = 0.6$

$(0.6)(1000)$

$= 600\,mm^3$

The current in a resistor is measured as 2.00 A ± 0.02 A. Which of the following correctly identifies the absolute uncertainty and the percentage uncertainty in the current?

	Absolute uncertainty	Percentage uncertainty
A.	±0.02 A	±1 %
B.	±0.01 A	±0.5 %
C.	±0.02 A	±0.01 %
D.	±0.01 A	±0.005 %

Which of the following lists **only** two vector quantities?

A. mass, energy, work

B. momentum, work, speed

C. weight, force, acceleration 2 vectors

D. momentum, energy, displacement

Two lengths, a and b, are measured to be 51 ± 1 cm and 49 ± 1 cm respectively. In which of the following quantities is the percentage uncertainty the largest?

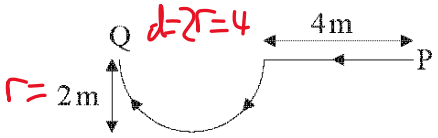
A. $a+b$

B. $a-b$

C. $a \times b$

D. $\frac{a}{b}$

Samantha walks along a horizontal path in the direction shown. The curved part of the path is a semi-circle.



The magnitude of her displacement from point P to point Q is approximately

A. 2 m.

B. 4 m.

C. 6 m.

D. 8 m.

e

The current I through a resistor is measured with a digital ammeter to be 0.10 A. The uncertainty in the calculated value of I^2 will be

$\left(\frac{0.01}{0.1}\right)(2)(100\%) \pm 0.01$

$= 20\%$

A. 1%.

B. 2%.

C. 5%.

D. 20%.

An object falls for a time of 0.25 s. The acceleration of free fall is 9.81 m s^{-2}. The displacement is calculated. Which of the following gives the correct number of significant digits for the calculated value of the displacement of the object?

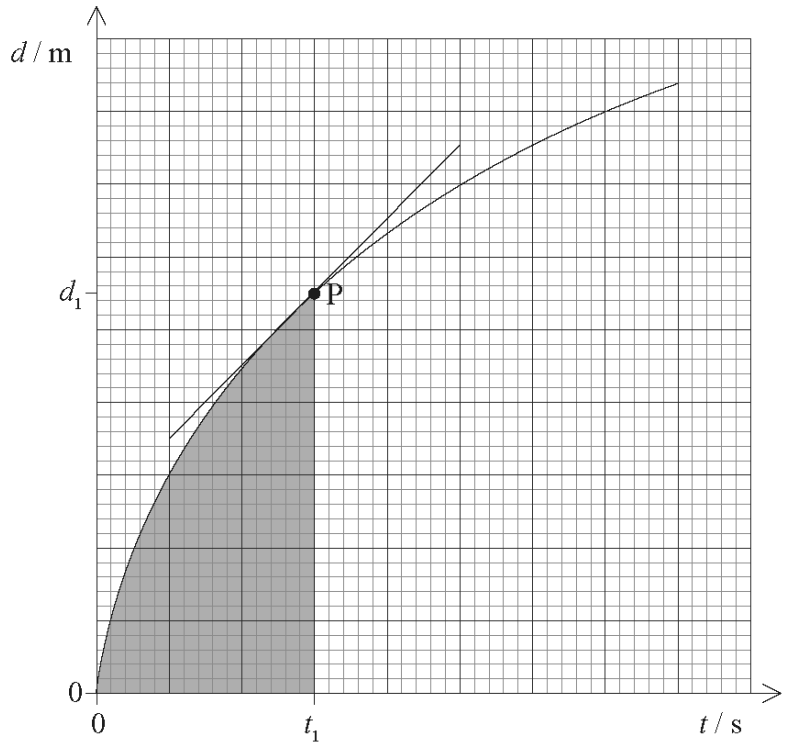
A. 1

B. 2

C. 3

D. 4

The graph shows how the displacement d of an object varies with time t. The tangent to the curve at time t_1 is also shown.



Which of the following gives the speed of the object at point P?

A. the gradient at P (Instaneous Speed)

B. the shaded area

C. $\dfrac{1}{\text{gradient at P}}$

D. $\dfrac{d_1}{t_1}$ (Average Speed)