SMART EXAM RESOURCES
9702 PHYSICS TOPIC QUESTIONS
TOPIC: PHYSICAL QUANTITIES AND UNITS
SUB-TOPIC: ERRORS AND UNCERTAINITIES
SUB-SUB-TOPIC:INDICATORS OF OF RANDOM AND SYSTEMATIC ERRORS

1 A student investigates the speed of a trolley as it rolls down a slope, as illustrated in Fig. 2.1.

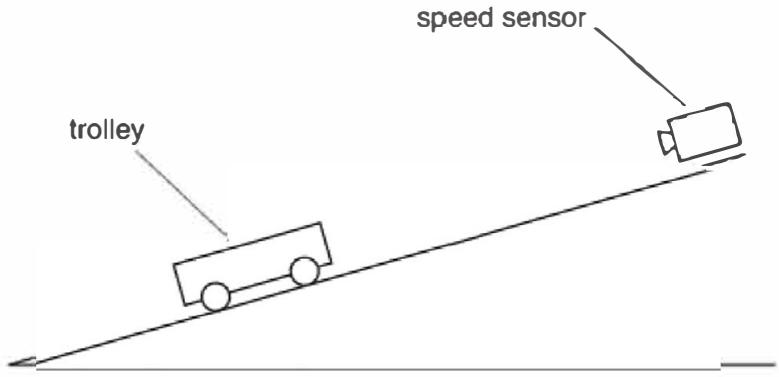

Fig. 2.1

The speed *v* of the trolley is measured using a speed sensor for different values of the time *t* that the trolley has moved from rest down the slope.

Fig. 2.2 shows the variation with *t* of *v*.

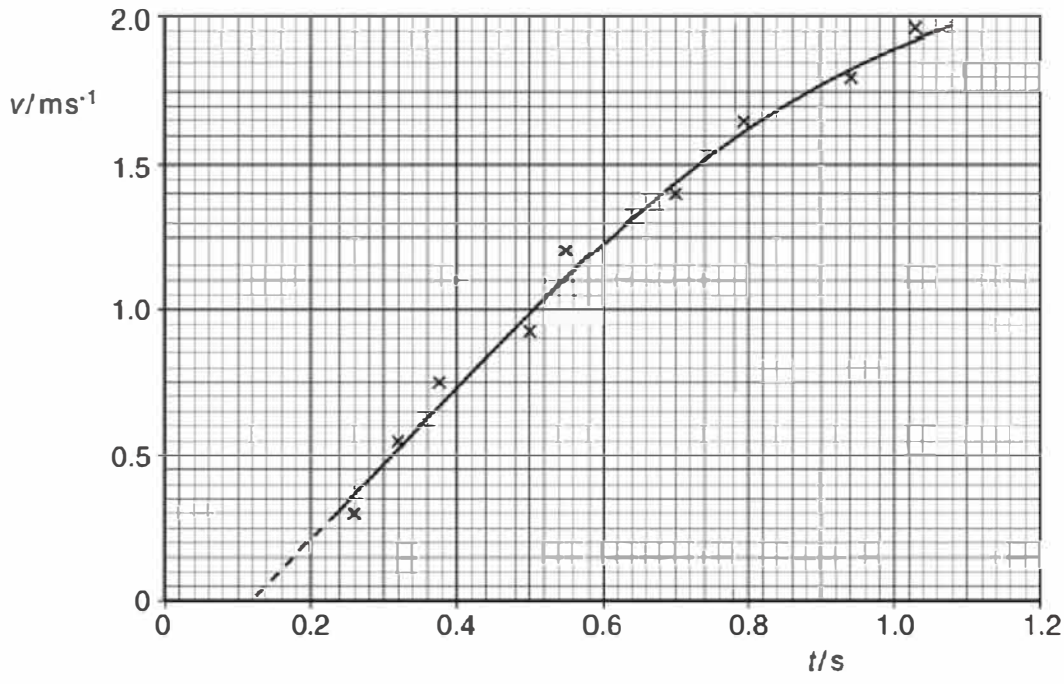

Fig. 2.2

Name the feature of Fig. 2.2 that indicates the presence of

(i) random error,

.....

..... [1]

(ii) systematic error.

.....

..... [1]

Mark Scheme:

(i)	scatter of points about line	B1	[1]
(ii)	intercept / line does not go through origin	B1	[1]

2 The volume of fuel in the tank of a car is monitored using a meter as illustrated in Fig. 1.1.

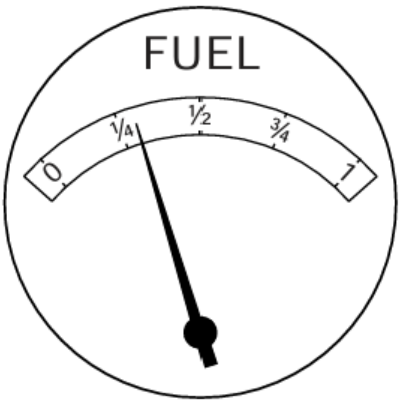

Fig. 1.1

There is a systematic error in the meter.

(i) State the feature of Fig. 1.2 that indicates that there is a systematic error.

.....

..... [1]

The meter has an analogue scale. The meter reading for different volumes of fuel in the tank is shown in Fig. 1.2.

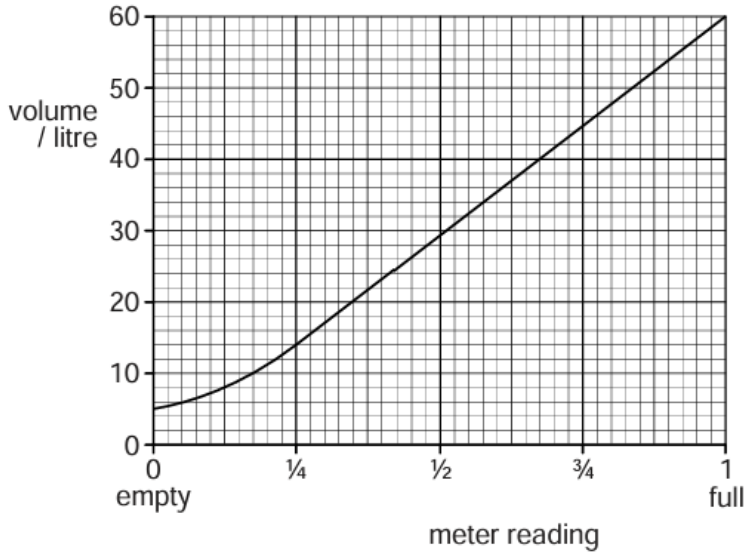

Fig. 1.2

The meter is calibrated in terms of the fraction of the tank that remains filled with fuel.

Mark Scheme:

(i) line/graph does not pass through ('empty, 0) / there is an intercept ..... B1 [1]
(*do not allow 'non-linear'*)

3 The measurement of a particular time interval is repeated many times. The readings are found to vary. The results are shown in Fig. 1.1.

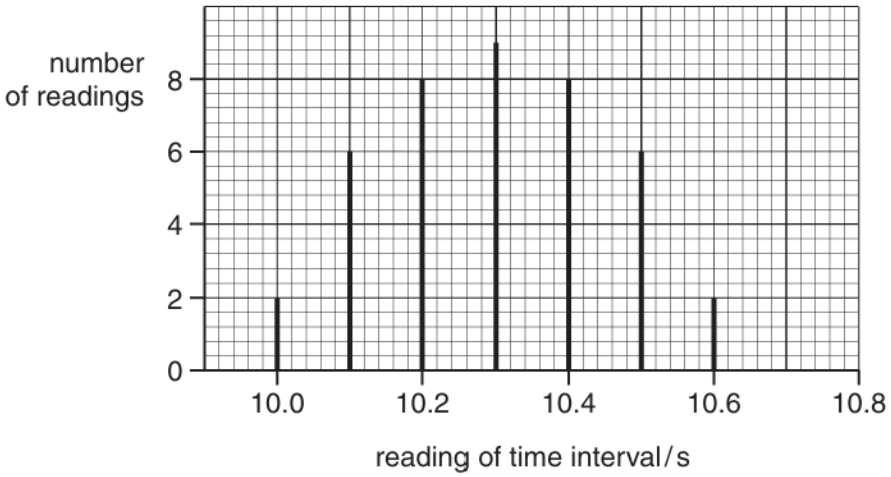

Fig. 1.1

The true value of the time interval is 10.1 s.

(i) State how the readings on Fig. 1.1 show the presence of

1. a systematic error,

.....

.....[1]

2. a random error.

.....

.....[1]

Mark Scheme:

(i)	1.	systematic error: the average / peak is not the true value / the readings are not centred around the true value	B1	[1]
	2.	random error: readings have positive and negative values around the peak value / values are scattered / wide range	B1	[1]