



Limits of accuracy

About 50 minutes Calculator allowed 39 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** Last lesson [2 marks]
Round 0.009920 to 2 significant figures. Simplify $\sqrt{45} + \sqrt{20}$.

Answer

Answer

- A3** From chapter 11 [2 marks] **A4** From chapter 11 [2 marks]
Find the distance between the points (4, 4, -1) and (1, 2, 5). In a right-angled triangle, the side opposite angle θ is 3 cm and the hypotenuse is 6 cm. Find angle θ .

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

A length is 6.4 cm to 1 decimal place. Write its error interval, l cm.**Hint** Go half of 0.1 either side. The upper bound is not included.

- B1** A mass is 2.38 kg to 2 decimal places. Write its error interval, m kg. [2 marks]

Answer $\dots \leq m < \dots$

EXAMPLE 2

Lengths of 8.3 cm and 5.6 cm are each to 1 decimal place. Work out their smallest possible difference.

Hint Take the smallest first length and the largest second length.

B2 A plank 46 cm long has a 17 cm piece cut off. Both are to the nearest cm. Work out the largest possible length left. [3 marks]

Answer

c Practice

C1 A school has 860 pupils, to the nearest 10. Write down the largest possible number of pupils. [1 mark]

Answer

C2 A number x is 3500, correct to 2 significant figures. Write down the error interval for x . [2 marks]

Answer $\dots \leq x < \dots$

C3 Ana truncates a number y to 1 decimal place. The result is 7.2. Write down the error interval for y . [2 marks]

Answer $\dots \leq y < \dots$

C4 A bag of sand has a mass of 25 kg, to the nearest kg. Work out the lower bound of the total mass of 4 bags. [2 marks]

Answer

C5 A square has sides of 7 cm, to the nearest cm. Work out the lower bound of its area. [2 marks]

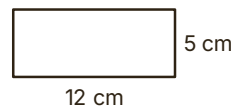


7 cm

Not drawn accurately

Answer

C6 A rectangle is 12 cm by 5 cm, each to the nearest cm. Work out the upper bound of its perimeter. [2 marks]



12 cm

5 cm

Not drawn accurately

Answer

D Exam-style questions

D1 Ravi says, "A rope is 4.7 m long, correct to 1 decimal place, so it could be 4.75 m long." [2 marks]

Explain why Ravi is wrong.

D2 A coach travels 120 km, correct to the nearest 10 km. The journey takes 3 hours, correct to the nearest hour.

(a) Write down the upper bound of the distance and the lower bound of the time. [2 marks]

Answer km and hours

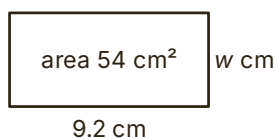
(b) Work out the upper bound of the average speed. [2 marks]

Answer

(c) The driver says, "The average speed was certainly more than 30 km/h." Is the driver right? Show how you decide. [2 marks]

Total for D2: 6 marks

D3 A rectangle has an area of 54 cm^2 , correct to 2 significant figures. Its length is 9.2 cm, correct to 1 decimal place. Work out the width w of the rectangle to a suitable degree of accuracy. You must show your working and give a reason for your answer. [4 marks]



Not drawn accurately

Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 $x = 2.4$ and $y = 0.6$, each correct to 1 decimal place. Work out the upper bound of $\frac{x+y}{x-y}$. Give your answer as a fraction. [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** x is on the top and the bottom. Test which way x should go to make the fraction biggest.
- Hint 2** $\frac{x+y}{x-y} = 1 + \frac{2y}{x-y}$, which is biggest when y is biggest and x is smallest.
- Hint 3** Use $x = 2.35$ and $y = 0.65$: $\frac{3}{1.7} = \frac{30}{17}$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can write an error interval for a rounded or a truncated value. ☐ ☐ ☐

I can choose the right bounds for a sum or a difference. ☐ ☐ ☐

I can choose the right bounds for a product or a quotient. ☐ ☐ ☐