Name:

Exam Style Questions

Limits of Accuracy

Corbettmaths

Equipment needed: Calculator, Pencil and Pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

www.corbettmaths.com/contents

Videos 183, 184

Answers and Video Solutions

1. A bag of apples weighs 7kg, correct to the nearest kilogram.
What is the least possible mass of the bag of apples?

6.5 .....kg
(1)

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2. The length of a table is 105 cm, correct to the nearest centimetre.

(a) Write down the smallest possible length of the table.

104.5 .....cm
(1)

(b) Write down the largest possible length of the table.

105.5 .....cm
(1)

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3. The speed of a car is 50 mph, correct to the nearest 10 mph.

(a) Write down the lower bound for the speed of the car

45 .....mph
(1)

(b) Write down the upper bound for the speed of the car

55 .....mph
(1)

4. The distance between the Sun and Earth is 150,000,000 km, correct to 2 significant figures.

(a) Write down the lower bound

145,000,000 km
(1)

(b) Write down the upper bound

155,000,000 km
(1)

5. An average clementine weighs 74g to the nearest gram. 74.5
A net contains 12 clementines.
The net weighs 20g to the nearest gram. 20.5

What is the maximum possible mass of the net of clementines.

$12 \times 74.5 + 20.5$

914.5 g
(3)

6. Find the least and greatest total length of 6 sausages, each measuring 8cm to the nearest centimetre.

7.5 × 6 = 45.0

8.5 × 6 = 51.0

Least length 45 cm

Greatest length 51 cm
(2)

7. Bethany thinks of a whole number.
When she rounds it to the nearest 10, the answer is 30

Sabrina thinks of a whole number.
When she rounds her number to the nearest 100, the answer is 200

Work out the maximum possible total of Bethany's and Sabrina's original numbers.

Bethany 34

Sabrina 249

+ 1

283

783

(3)

8. Curtis has £13 to the nearest pound. £12.50 £13.49
Dylan has £5.20 to the nearest 10p. £5.15 £5.24

Work out the minimum possible difference between the amount of money Curtis has and the amount of money Dylan has.

$$\begin{array}{r} {}^{0}\,{}^{1}\,{}^{4}\,{}^{1} \\ \not{1}\not{2}\cdot\not{5}0 \\ -\ 5.24 \\ \hline 7.26 \end{array}$$

£7.26

(3)

9. Saul makes 20 litres of fruit punch, correct to the nearest litre.

He pours the fruit punch into cups that hold 200ml, correct to the nearest 10ml.

Work out the largest number of cups that Saul could possibly fill.

max 20.5 litres

min 195 ml

20500 ÷ 195 = 105.128...

105

.....

(3)

10. A biology textbook has mass 1.3kg to the nearest 100g. 1.35kg
A shelf can safely hold 80kg of books.

How many books can safety be held by the shelf?
You must show your working.

80 ÷ 1.35 = 59.259...

59

.....

(3)

11. A rectangular rugby pitch has width 74 metres, measured to the nearest metre.

(a) Write down the upper bound of the width of the pitch.

74.5 .....m
(1)

The length of the pitch is 115 metres, measured to the nearest 5 metres.

(b) Work out the upper bound for the perimeter of the pitch

74.5 + 74.5 + 117.5 + 117.5

384 .....m
(3)

12. Anthony measured the length and width of a rectangle.
He measured the length to be 18cm correct to the nearest centimetre. 17.5
He measured the width to be 10cm correct to the nearest 10 centimetres. 5

Calculate the lower bound for the area of this rectangle.

17.5 × 5 = 87.5

87.5 .....cm²
(2)

13. A circular mirror has a diameter of 60cm to the nearest centimetre.

60.5

Find the greatest possible area of the mirror.
Give your answer in cm²

r = 30.25

$\pi \times 30.25^2 = 2874.75...$

2874.754 .....cm²
(3)

14. The heights of 6 plants are listed below.
Each height is given to one decimal place.

4.55	7.25	8.15	9.65	9.15	3.15
4.5cm	7.2cm	8.1cm	9.6cm	9.1cm	3.1cm
4.45	7.15	8.05	9.55	9.05	3.05

(a) Work out the smallest possible mean.

$41.3 \div 6 = 6.883...$

6.8833 .....cm
(2)

(b) Work out the greatest possible range.

$9.65 - 3.05 = 6.6$

6.6 .....cm
(2)

15. The width of a rectangle is 50cm, correct to 2 significant figures.
The length of a rectangle is 115cm, correct to 3 significant figures.

(a) Write down the lower bound for the width.

49.5 .....cm
(1)

(b) Calculate the lower bound for the area of the rectangle.

$49.5 \times 114.5 = 5667.75$

5667.75 .....cm^2
(2)

65 75

16. $c = 70$ to 1 significant figure.

$d = 12$ to the nearest whole number.

11.5 12.5

Work out the lower bound of $5c^2 - 2d^3$

$5 \times 65^2 - 2 \times 12.5^3$

17218.75

.....

(3)

17. $w = \dfrac{\sqrt{m}}{t}$

4.15 4.25

$m = 4.2$ correct to 1 decimal place.

t = 0.08 correct to 1 significant figure.

0.075 0.085

Work out the lower bound for the value of w.

$w = \dfrac{\sqrt{4.15}}{0.085}$

$w = 23.96527799$

23.9665

.....

to 4dp. **(3)**

18. Declan ran a distance of 200m in a time of 26.2 seconds.

195 205

The distance of 200m was measured to the nearest 10 metres.
The time of 26.2 was measured to the nearest tenth of a second.

26.15 26.25

(a) Work out the upper bound for Declan's average speed.

$$\text{Max } S = \frac{\text{max } d}{\text{min } t}$$

$$= \frac{205}{26.15}$$

7.83938... .....m/s

(2)

(b) Work out the lower bound for Declan's average speed.

$$\text{Min } S = \frac{\text{Min } d}{\text{Max } t}$$

$$= \frac{195}{26.25}$$

7.42857... .....m/s

(2)

19. A circle has an area of 120cm² to the nearest 10cm².

Work out the upper bound of the radius

$$\text{Max Area} = 125$$

$$\pi r^2 = 125$$

$$r^2 = \frac{125}{\pi}$$

$$r = \sqrt{\frac{125}{\pi}}$$

$$= 6.30783...$$

6.3078... .....cm

(3)

20. Sophie estimated that the distance between Bristol and Newcastle is about 290 miles and that her average driving speed would be 60 mph.

She estimated the distance to the nearest 10 miles and the speed to the nearest 10 mph.

quickest time.

Calculate the lower bound of the time the journey should take.
Give your answer in hours and minutes.
Give your answer to the nearest minute.

quickest $t = \frac{d \text{ (min)}}{s \text{ (max)}}$

$t = \frac{285}{65} = 4.384615385...$

$0.384615385... \times 60 = 23.076...$

.....4.....hours .....23.....minutes
(4)

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21. The final velocity of a traveling object is given by the formula

$$v = u + at$$

where v is the final velocity
u is the initial velocity
a is the acceleration
and t is the time

Given u = 2.4 m/s correct to 2 significant figures, 2.35
a = 12 m/s² correct to 2 significant figures, 11.5
and t = 5 seconds correct to 1 significant figure. 4.5

Calculate the lower bound for v.

$v = 2.35 + 11.5 \times 4.5$

$v = 54.1$

.....54.1.....m/s
(4)

22. The curved surface area of a cone is given by the formula

$$A = \pi rl$$

max min

where A is the curved surface area
r is the radius of the base of the cone
and l is the slant height

Given A = 220 cm² correct to 3 significant figures,
and r = 8 cm correct to 1 significant figure.

Calculate the upper bound for l

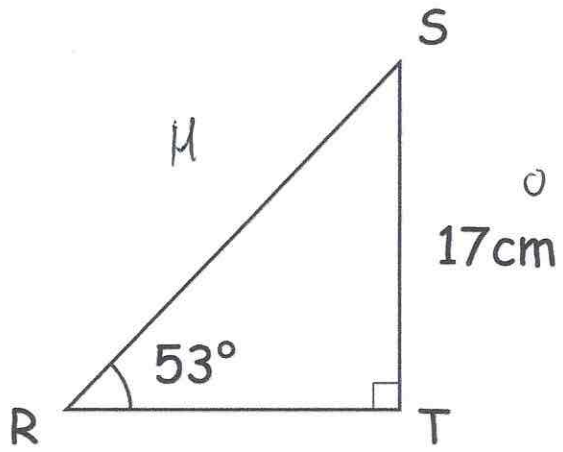
$220.5 = \pi \times 7.5 \times l$

$l = \frac{220.5}{7.5\pi}$

$l = 9.358310654$

9.3583...
.....cm
(3)

23. Shown below is triangle RST.
Angle SRT is 53°, to the nearest degree.
ST is 17cm to the nearest centimetre.



S O
H

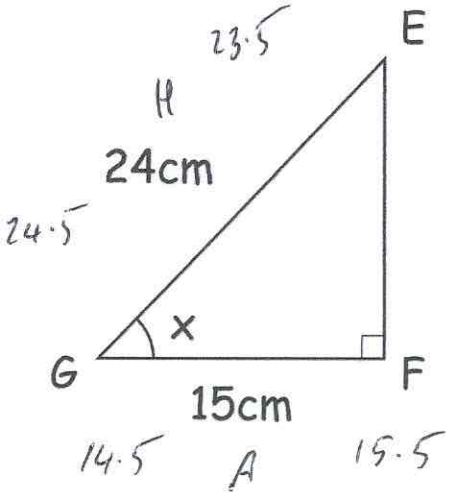
Work out the upper bound for the length of RS.

$RS = \dfrac{17.5}{\sin(52.5)}$ ← max
← min

$RS = 22.058267\ldots$

22.058...
.....cm
(4)

24. Shown below is triangle DEF.



The lengths of EG and FG are given to the nearest centimetre.

Calculate the lower bound for the size of angle EGF

$\cos x = \frac{A}{H}$

$\cos x = \frac{15.5}{23.5}$

$x = 48.73257...$

$\cos x = \frac{14.5}{24.5}$

$x = 53.712...$

48.7325...°

(4)

LB: 9.95 UB: 10.5

25. The length of the base of a triangle is 10cm, correct to 2 significant figures.
The length of the perpendicular height of a triangle is 15cm, correct to 2 significant figures. 14.5 15.5

(a) Calculate the upper bound for the area of the triangle

$\frac{1}{2} \times 10.5 \times 15.5$

81.375 .....cm²

(2)

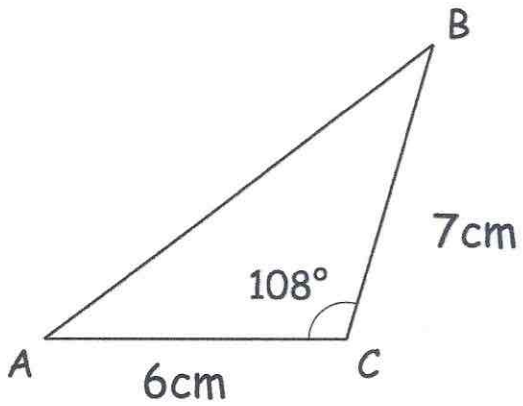
(b) Calculate the lower bound for the area of the triangle

$\frac{1}{2} \times 9.95 \times 14.5$

72.1375 .....cm²

(2)

26. Shown below is triangle ABC.



AC = 6cm correct to the nearest cm.

BC = 7cm correct to the nearest cm.

ACB = 108° correct to the nearest degree.

Note

$\sin 107.5 > \sin 108.5$

Calculate the lower bound for the area of triangle ABC.

$A = \frac{1}{2} a b \sin C$

$= \frac{1}{2} \times 5.5 \times 6.5 \times \sin 108.5$

$= 16.9512...$

16.951...

.....cm²

(4)

17.5% / 18.5 %

6150 / 6250

27. After a reduction of 18% from the original price, a motorbike sold for £6200
Both of these values are correct to 2 significant figures.

Calculate the greatest possible original price of the motorbike.

$100 - 18.5 = 81.5$

$y \times 0.815 = 6250$

$y = \frac{6250}{0.815}$

$= £7668.71$ to nearest penny

£7668.71

(3)

28. A sculptor wants to transport a piece of rock.
It is a sphere with radius 0.3m to the nearest centimetre.
The density of the rock is 7.98g/cm³
The truck can carry up to 1000kg to one significant figure.

$V = \frac{4}{3}\pi r^3$

Can the sculptor safely transport the rock?
You **must** show your working.

$0.3m = 30cm$

LB → 29.5cm UB → 30.5cm

LB = 950kg

Check max mass

$V = \frac{4}{3} \times \pi \times 30.5^3$

$= 118846.9737\ cm^3$

$118846.97... \times 7.98 = 948398.65g$

948.39... kg

948.39... < 950

Yes

(4)