Q1.

Alternative method 1

(Width =) 10 or (length =) 15 seen

May be on the diagram

B1

their height × their width × their length with at least two values correct
or 5 × 10 × 15

M1

750

Ignore incorrect units, eg cm²
SC2 for 6000 from using 10 as diameter

A1

Alternative method 2

5 × 5 × 5 or 125

B1

6 × their 125

their 125 must be from 5 × 5 × 5

M1

750

Ignore incorrect units, eg cm²
SC2 for 6000 from using 10 as diameter

A1

Additional Guidance

On diagram, height marked as 10, width as 10 and length as 15

B1

10 × 10 × 15

M1

1500

A1

On diagram, height marked as 10, width as 20 and length as 15

B1

10 × 20 × 15

M1

3000

A1

On diagram, height marked as 10, width as 20 and length as 30
10 × 20 × 30
6000

SC2

On diagram, height marked as 5, width as 10 and length as 15
In script 10 × 20 × 30

6000

Mark method that leads to answer.

SC2

On diagram, height marked as 5, width as 20 and length as 30

B0

5 × 20 × 30

M0

3000

A0

5 × 10 × 15 = 750

B1

750 ÷ 3 = 250 (on answer line)

Mark whole method

M0, A0

[3]

Q2.

Side of square = 5
Or 5 × 5 = 25 oe

May be on diagram

B1

400 ÷ 25

M1

16

May be on diagram
16 × 25 = 400 oe is M1, A1

A1

Yes and 5 and their 16

Strand (iii) Conclusion must be based on length not volume
ft their 16 if B1, M1 awarded and correct conclusion

Q1ft

Additional Guidance

Ignore any volume calculations

Square = 5 cm

B1

25 × 21 = 400

M1

No

A0
Q1ft

[4]

Q3.

$\frac{1}{3} \times \frac{1}{2} \times x \times x \times 2x$

or $\frac{1}{3} \times \frac{1}{2} \times CB \times DB \times AB$ (2 *BC*)

$\frac{1}{2} \times x \times x \times 2x = 24$ *is M1 by implication.*

M1

$x^3 = 216$

M1

6

6 from T&I is 3 marks
6 without verification or working is 1 mark.

A1

[3]

Q4.

$\pi rl + \pi r^2 = 24\pi$

15π

M1

$3l + 9 = 24$

oe e.g. $3\pi l = 15\pi$

M1

5

SC1 for 8 from $\pi rl = 24\pi$ *Must see working*
SC1 for 6 from $\pi rl + 2\pi r = 24\pi$ *Must see working*
NB *if height calculated after 5 seen ignore*

A1

[3]

Q5.

Alternative method 1

$2x \times 2x \times x$

M1

$\frac{4}{3}\pi x^3$ and $4x^3$

Allow × *signs, eg* $\frac{4}{3} \times \pi \times x^3$

A1

$\frac{4}{3}\pi x^3$ and $4x^3$ and justification such that

$\frac{\pi}{3} > 1$ or $\frac{4}{3}\pi > 4$

Strand (ii)

Q1

Alternative method 2

Chooses a value for r, say 10

$\frac{4}{3} \times \pi \times 10^3$ **and** $20 \times 20 \times 10$

M1

$\frac{4000\pi}{3}$ **and** 4000 or numerical values if π taken as 3.1, say

If values are calculated wrongly do not award this mark but Q mark can still be gained

A1

their $\frac{4000\pi}{3}$ **and** their 4000 with at least one correct and justification such that $\frac{\pi}{3} > 1$ or $\frac{4}{3} > \pi$; 4 oe

$\pi > 3$ not enough without justification that $\frac{4000\pi}{3}$ will be greater than 4000

Q1

Additional Guidance

Note that $\frac{4}{3} \pi r^3$ is just quoting the given formula. Must have $\frac{4}{3} \pi x^3$ and $4x^3$

Note that truncation of π to 3.1 or 3.14 is OK but rounding up is not. This would negate the Q mark.

Let $r = 2$,

$\frac{4}{3} \times \pi \times 2^3 = 1.3 \times \pi \times 8 = 10.4\pi$

M1

$4 \times 4 \times 2 = 32$

A1

$10.4 \times 3.1 = 31.2 + 1.04 = 32.24 > 32$

Q1

Truncating values of $\frac{4}{3}$ and π but showing that this still gives a value greater than 3 is acceptable

$2x \times 2x \times x = 4x^3 = 1.3 \times 3.14 \times x^3$

M1

Uses box method to get $4.29x^3$

A1

Sphere = $4.29x^3$ > Cuboid $4x^3$

Q1

$1.3 \times 3.14 \neq 4.29$

Let $r = 4$,

$\frac{4}{3} \times \pi \times 4^3 = \frac{4}{3} \times \pi \times 64 = \frac{256}{3}\pi$

$8 \times 8 \times 4 = 256$

M1

$\frac{256}{3}\pi > 256$

$\frac{\pi}{3} > 1$

A1

$\pi > 3$

Q1

[3]

Q6.

area A = 24(cm^2) or
area B = 6 (cm^2)

M1

24 : 6

A1

4 : 1

ft simplifying their ratio

B1ft

[3]

Q7.

(a) 400 ÷ 2 or 400 − 200 or 200

or 400 ÷ 4 or 400 − 200 − 100

or 400 − 300 or 100

or 400 ÷ 8

or 400 − 200 − 100 − 50

or 400 − 350

oe
One correct step
Working may be on diagram

M1

50

A1

Additional Guidance

400 − 100 − 100 − 100 = 100 is M0 A0

100 as final answer with no working shown is M0 A0

(b) 400 × 2 × 2 or 400 × 4 or 800 × 2

or 400 × 4

or 1600

or 0.4

oe

M1

1.6

SC1 for a correct conversion for their 1600

A1

Additional Guidance

1200 ml = 1.2 l is SC1

1000 ml = 1 l with 1 on answer line is M1 A0

1 l = 1000 ml alone is M0 A0

[4]

Q8.

(a) 10.8 × 8 or 86.4

M1

50 × 110 × 35 or 192 500

Must use correct volume formula

M1

their 192 500 ÷ 1000 or 192.5

Dep on 2nd M1

M1dep

their 192.5 – their 86.4

Dep on M1M1M1

M1dep

106.1 or 106

A1

Alternative method 2

10.8 × 8 × 1000 or 86 400

oe

M1

50 × 110 × 35 or 192 500

Must use correct volume formula

M1

their 192 500 – their 86 400 or 106 100

Dep on M1M1

M1dep

their 106 100 ÷ 1000

Dep on M1M1M1

M1dep

106.1 or 106

A1

Additional Guidance

192.5

2ndM1M1dep

106 100

M1M1M1dep

50 × 110 × 35 = 192 500 ÷ 2

2ndM0

(b) A comment that the answer to part (a) was too low or that the amount saved would be greater

B1

Additional Guidance

It was more

B1

More water saved

B1

She underestimated it

B1

She underestimated the water saved

B1

She's saving more water because she's using more water than the cuboid

B1

Greater than 106.1 litres (may need to check value in part (a) if they quote a different value)

B1

More than Eva's assumption

B1

Eva's assumption was not accurate therefore the prediction was wrong

B0

She underestimated the water

B0

Less water used

B0

It was inaccurate

B0

A uses more water than B (only talking about the diagram)

B0

B saves more than A (only talking about the diagram)

B0

Saves a lot of water

B0

More water used

B0

Cuboid smaller than bath

B0

Used more water in the bath than she thought

B0

[6]

Q9.

12.9 × 12.9 or 166.41

M1

$\frac{1}{3}$ × their 166.41 × 17.4

M1

965.178 or 965.18 or 965.2 or 965

A1

[3]

Q10.

$\frac{1}{3} \times \pi \times 9^2 \times 16$ or 432π

oe

[1356, 1357.4]

M1

$(\frac{1}{2} \times) \frac{4}{3} \times \pi \times 9^3$ or 486π or 972π

oe

[1526, 1527.1] or [3052, 3054.1]

M1

[1356, 1357.4] and [1526, 1527.1]
or 432π and 486π

A1

[2882, 2884.5] or 2900
or 918π

A1

Additional Guidance

2900 with or without working

4 marks

[4]

Q11.

Alternative method 1

$\frac{1}{3}\pi(r+2)^2 r$

M1

$\frac{4}{3}\pi r^3 = \frac{1}{3}\pi(r+2)^2 r$

oe

M1dep

$3r^2 - 4r - 4 \ (= 0)$
or $3r^2 - 4r = 4$

oe

Reduces to three term quadratic

M1dep

$(3r + 2)(r - 2) \ (= 0)$

M1dep

2

must discard $r = -\frac{2}{3}$

SC2 Answer 2 with no working

A1

Alternative method 2

$\frac{1}{3}\pi(r+2)^2 r$

M1

$\frac{4}{3}\pi r^3 = \pi(r+2)^2 r$

oe

M1dep

$4r^2 = (r + 2)^2$

M1dep

$2r = r + 2$

M1dep

2

SC2 Answer 2 with no working

A1

Additional Guidance

Answer $r = 2$ and $r = -\frac{2}{3}$

If there is incorrect working, unless recovered, apply the scheme even if r = 2 is seen

M4 A0

[5]

Q12.

125 : 27

B1

[1]

Q13.

(a) $\frac{4}{3} \times \pi \times 8^3$

oe

M1

[2143, 2145] or $\frac{2048}{3}\pi$

A1

Additional Guidance

$\frac{4}{3} \times 3(.1) \times 8^3$

M0

(b) 8 × 2 or 16

May be seen on diagram

M1

8 × 6 or their 16 × 3 or 48

May be seen on diagram

M1

their 16 × their 16 × their 48

oe

M1

12288

SC2 1536

A1

[6]

Q14.

144% or 1.44 seen

B1

$\sqrt{1.44}$ or 1.2

oe

M1

their 1.2 × 32

M1dep

38.4

A1

[4]