Mark schemes

Q1.

$n + 1$

B1

[1]

Q2.

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]

Q3.

edges

B1

[1]

Q4.

1 × x **or** 3 × (x + 2)
or 1 × (3 + x) **or** 3 × (x + 1)

Shows the area of any appropriate rectangle
Allow invisible brackets

M1

x + 3(x + 2)
or (3 + x) + 3(x + 1)

Allow invisible brackets

M1dep

x + 3x + 6 = 12
or 3 + x + 3x + 3 = 12

oe eg 4x + 6 = 12
Invisible brackets expanded correctly

M1dep

1.5

oe

A1

Alternative method 1

$(x + 2)(x + 3)$ **or** $x(x + 1)$

Allow invisible brackets

M1

$(x + 2)(x + 3) - x(x + 1)$

Allow invisible brackets

M1dep

$x^2 + 2x + 3x + 6 - x^2 - x = 12$

oe Invisible brackets must be expanded correctly

M1dep

1.5

oe eg $\frac{6}{4}$

A1

Alternative method 2

Guess a value for x and correctly works out area below 12 cm^2

eg $x = 1$ *gives* $(1 + 9) = 10$
or $(4 + 6) = 10$
$x = 0.5$ *gives* 8

M1

Guess a value for x and correctly works out area above 12 cm^2

eg $x = 2$ *gives* $(2 + 12) = 14$
or $(5 + 9) = 14$
$x = 2.5$ *gives* 16, $x = 3$ *gives* 18,
$x = 3.5$ *gives* 20

M1

Tries a value between 1 and 2 and correctly works out area

M1dep

1.5

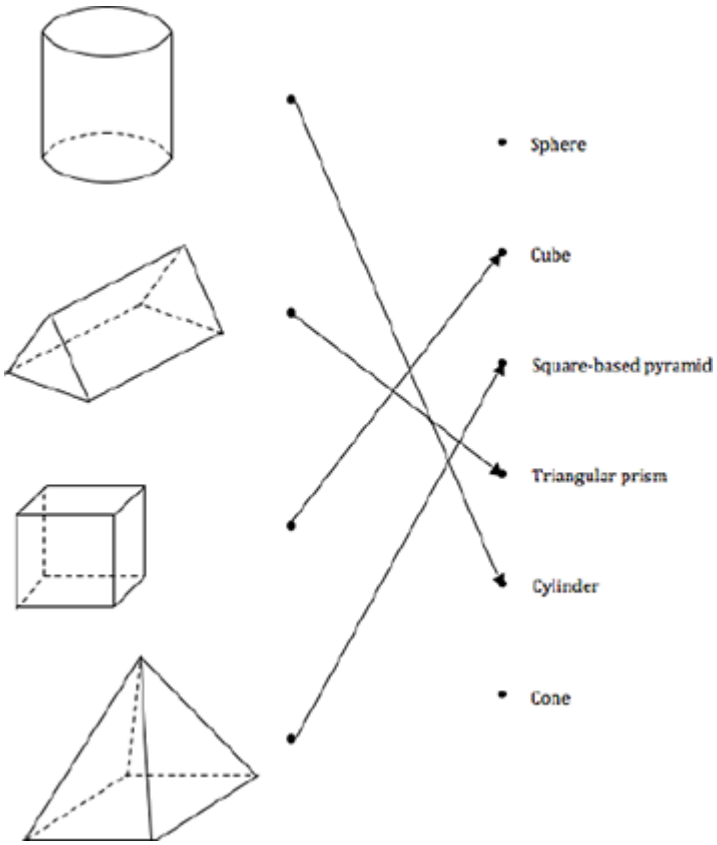
oe
SC2 3×3.5 *and* 1×1.5 *seen*
or 3×2.5 *and* 1×4.5 *seen*

A1

[4]

Q5.

(a)



B2 two correct

B1 one correct

B3

(b) (l =) 40

SC2 40, 24, 20 assigned to the wrong dimensions

or

SC2 length 40, height 24 and width 20 with further work seen on answer line

or

SC1 two of 40, 24, 20 seen

May be on diagram

B1

(h =) 24

SC2 40, 24, 20 assigned to the wrong dimensions

or

SC2 length 40, height 24 and width 20 with further work seen on answer line

or

SC1 two of 40, 24, 20 seen

May be on diagram

B1

(w =) 20

SC2 40, 24, 20 assigned to the wrong dimensions

or

SC2 length 40, height 24 and width 20 with further work seen

on answer line
or
SC1 two of 40, 24, 20 seen
May be on diagram

B1

[6]

Q6.

(a) 8

B1

(b) 2

B1

[2]

Q7.

(a) $\frac{1}{2}(b + 2b)h$ or $3 \times \frac{1}{2}bh$

oe

M1

$1.5bh$ or $\frac{3}{2}bh$ or $\frac{3bh}{2}$ or $1\frac{1}{2}\ bh$

accept hb for bh

A1

Additional Guidance

Correct expression with ×, ÷ or brackets

M1A0

Condone units within expressions for M1 only

Condone the expression given within a formula

eg A = $1.5hb$

M1A1

Condone correct expression stated and then equated to a value or with values substituted

M1A1

(b) $3b + 2s$

or $3b = 2s$

or $4s$

oe

M1

$6b$

oe

eg $b + b + b + b + b + b$

A1

Additional Guidance

Condone the expression given within a formula

eg $P = 6b$

M1A1

[4]

Q8.

Any product seen or implied of 2 numbers that make 12 or 15 or 20

M1

All three of 3, 4 and 5 stated or marked on diagram

M1dep

60

Answer only of 60 with no product seen is 3 marks

A1

3 × 4 × 5 or correctly evaluated product of their 3 sides, 2 of which must be correct

Strand (ii)

Product must be seen

Q1

Alternative method

Any one of 3, 4 or 5 seen on diagram (correctly for the net) or any sides of cuboid

M1

Side found and corresponding cross-section identified

M1dep

60

Answer only of 60 with no product seen is 3 marks

A1

Correct side and cross-section multiplied, ie 5 × 12 or 4 × 15 or 3 × 20

Strand (ii)

Product must be seen

Q1

Additional Guidance

Beware of 60 from incorrect work.
No incorrect work and answer of 60 is 3 marks
1 side correct maximum 1 mark
2 sides correct maximum 2 marks
Use positive marking.

[4]

Q9.

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

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

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

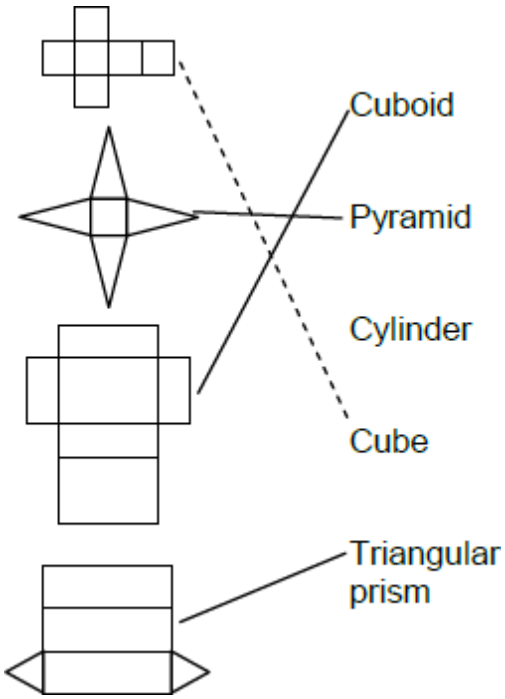
A1

$\pi > 3$

Q1

[3]

Q10.



B2 any two correct
B1 any one correct

B3

[3]

Q11.

Alternative method 1

0.9^2 or 0.81

oe

M1

4.86

A1

48 600

ft their 4.86 × 10 000 correctly evaluated
their 4.86 cannot be 0.9

B1ft

Alternative method 2

90 (cm)

B1

(their 90)² or 8100

oe

M1

48 600

ft (their 90)² × 6 correctly evaluated

A1ft

Additional Guidance

In Alt 1, award the B1ft if their answer clearly comes from multiplying a value by 10 000, but not from 0.9 × 10 000 = 9000

0.9 m = 9 cm

B0

9 × 9 = 81 (9 is their 90)

M1

81 × 6 = 486

A1ft

No conversion shown

B0

9 × 9 = 81 (9 is their 90)

M1

81 × 6 = 486

A1ft

0.9 × 0.9 = 0.81 and 0.81 × 0.9 = 0.729

M0

0.9 × 0.9 = 0.81 and 0.81 × 0.9 = 0.729

M0A0

(0.729 × 10 000) = 7290

B1ft

[3]

Q12.

(It should be) 8 faces

oe

B1

(It should be) 18 edges

oe

B1

[2]

Q13.

128 × 128 (× 2) or 16 384 or 32 768
or 128 × 64 (× 4) or 8192 or 32 768

Any one surface area of cuboid
May be implied

M1

128 × 128 × 2 + 128 × 64 × 4
or 16 384 × 2 + 8192 × 4
or 32 768 + 32 768
or 65 536

Total surface area of cuboid

M1dep

$\pi \times 32^2$ (× 2) or 1024π or 2048π

or [3215, 3217.41]
or [6430.7, 6434.82]
or $2 \times \pi \times 32 \times 256$ or $16\,384\pi$
or [51 445.76, 51 478.53]

Any one surface area of cylinder
May be implied

M1

$18\,432\pi$ or [57 876, 57 913.344]

Total surface area of cylinder

A1

65 536 and [57 876, 57 913.344]
and cylinder

ft M2 with at least one correct total surface area with correct conclusion

A1ft

Additional Guidance

Cylinder by [7622.656, 7660]

M1M1M1A1A1

Cylinder with no other working

0

[5]

Q14.

(a) Parallelogram

Accept Quadrilateral

B1

(b) Cuboid

Accept Rectangular prism

B1

Cylinder

Accept Circular prism
Do not Accept Tube

B1

[3]

Q15.

Any combination of 5 or 4 seen or implied
or 34 − 2 or 32 seen
or 34 − 10 or 24 seen

eg 4 + 4 …
5 + 5
5 + 4 …
14, 18, …
9, 13, …

M1

$(34 - 2) \div 4$ or $(34 - 2 \times 5) \div 4$ (= 6)

oe

5 + 4 + 4 + 4 + 4 + 4 + 4 + 5
or 14, 18, 22, 26, 30, 34
or 9, 13, 17, 21, 25, 29, 34

M1 dep

8

A1

[3]

Q16.

0.8^3 or 0.512
or 80 × 80 × 80

oe

M1

512000

A1

[2]

Q17.

(a) $\frac{1}{2}$ (6.5 + 8.3) 3.2

M1

23.68 or 23.7

A1

(b) their 23.68 × 200

M1

4736 or 4740

A1 ft

[4]

Q18.

(a) $\frac{4}{3}$ × π × 8^3

oe

M1

[2143, 2145] or $\frac{2048}{3}$ π

A1

Additional Guidance

$\frac{4}{3}$ × 3(.1) × 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]

Q19.

1.5 or $\frac{2}{3}$ seen

or $\frac{1}{2}$ seen as a scale factor

oe

12 : 8

8 : 12

tan $C = \frac{8}{11}$ *or 36°*

$\frac{12}{EC} = \frac{8}{11}$ or $\frac{EC}{12} = \frac{11}{8}$ or $\frac{11 \times 12}{8}$

M1

11 × 1.5 or 11 × $\frac{1}{2}$

$\frac{1}{2} \times 11 \times 8 \times 1.5^2$

oe

$CE = \frac{12}{\tan(\text{their } 36)}$

M1dep

16.5 or 5.5

99

16.5(…) or 5.5(…)

A1

$\frac{1}{2}$ (8 + 12) × their 5.5

or

$\frac{1}{2}$ (8 + 12) × their ED

their 99 − $\frac{1}{2}$ × 11 × 8

$\frac{1}{2}$ × *their 16.5* × *12* − $\frac{1}{2}$ × *11* × *8*

their ED × *8* + $\frac{1}{2}$ *x their* ED × *4*

M1

55

A1

[5]

Q20.

(a) **Alternative method 1**

10 ÷ 4 or 2.5

or 4 ÷ 10 or 0.4

or $\frac{1}{2}$ × (18 + 10) × 25 or 350

oe

M1

18 ÷ their 2.5
or 18 × their 0.4 or 7.2
or 25 ÷ their 2.5
or 25 × their 0.4 or 10

oe

M1dep

$\frac{1}{2}$ × (18 + 10) × 25 or 350

and

$\frac{1}{2}$ × (their 7.2 + 4) × their 10 or 56

Must see working

M1dep

350 – 56 = 294

Do not award without working seen

A1

Alternative method 2

10 ÷ 4 or 2.5

or 4 ÷ 10 or 0.4

or $\frac{1}{2}$ × (18 + 10) × 25 or 350

oe

M1

(Area scale factor =) (their 2.5)²
or (their 0.4)²

M1dep

their 350 ÷ (their 2.5)²
or their 350 × (their 0.4)² or 56

Must see working

M1dep

350 – 56 = 294

Do not award without working seen

A1

(b) $\frac{18 - 10}{2}$ or 4

B1

$\tan x = \frac{25}{\text{their } 4}$

M1

[80.9, 81]

A1

[7]