National 5 Mathematics

Volume - Solutions

Marks are indicated in brackets after each question number

2014 Paper 2 Question 7, (5)

Volume of cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi \ x \ 4^2 \ x \ 15 = 251.3 \ cm^3.$

Volume of hemisphere $= \frac{4}{3}\pi r^3 \div 2$

$= \frac{4}{3}\pi \ x \ 3.7^3 \div 2$

$= 106.1 \ cm^3.$

Volume of glass part $= 251.3 - 106.1 = 145.2 \ cm^3.$

2015 Paper 2 Question 6, (3) (2)

a) Volume of Sphere $= \frac{4}{3}\pi r^3$

Volume of the Earth $= \frac{4}{3}\pi \ x \ 6{,}400^3$

$= 1,098,066,219{,}443$

$= 1{,}100{,}000{,}000{,}000$

$= 1.1 \ x \ 10^{12}.$

b) $\frac{1.1 \ x \ 10^{12}}{2.2 \ x \ 10^{10}} = 0.5 \ x \ 10^2 = 0.5 \ x \ 100 = 50$

So, 50 times

2016 Paper 2 Question 7, (5)

Volume of large cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \ x \ \pi \ x \ 16^2 \ x \ 24$

$= 6{,}400 \ cm^3$ to 2 s.f.

Volume of small cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\ x\ \pi\ x\ 9^2\ x\ 13.5$

$= 1{,}100\ cm^3$ to 2 s.f.

Volume of carton $= 6{,}400 - 1{,}100 = 5{,}300\ cm^3$ to 2 s.f.

2017 Paper 2 Question 6, (5)

Volume of outer sphere $= \frac{4}{3}x\ \pi\ x\ 12^3 = 7{,}240\ mm^3$.

Volume of inner sphere $= \frac{4}{3}x\ \pi\ x\ 9^3 = 3{,}050\ mm^3$.

Volume of coating $= 7{,}240 - 3{,}050 = 4{,}190\ mm^3$.

2018 Paper 1 Question 17, (3)

Volume $= \frac{1}{3}Ah$

$138 = \frac{1}{3}\ x\ 6^2\ x\ h$

$138 = 12h$

$h = \frac{138}{12} = \frac{69}{6} = 11.5$

$h = 11.5$ cm

2018 Paper 2 Question 7, (3)

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

$= \frac{4}{3}\ x\ \pi\ x\ 3.2^2$

$= 137.2582$

$= 140\ cm^3$

2018 Paper 2 Question 11, (3)

$85\% = 9.3\ x\ 10^{11}$

$1\% = (9.3\ x\ 10^{11}) \div 85$

$100\% = [(9.3\ x\ 10^{11}) \div 85]\ x\ 100$

$= 1{,}094{,}117{,}647{,}058 = 1.09\ x\ 10^2$

2019 Paper 2 Question 8, (5)

Volume of hemi-sphere $= \frac{1}{2}\ x\ \frac{4}{3}\pi r^3$

$= \frac{1}{2}\ x\ \frac{4}{3}\ x\ \pi\ x\ (12^3)$

$= 3,619.11\ cm^3.$

Volume of cylinder $= \pi\ r^2 h$

$= \pi\ x\ (12^2)\ x\ (70 - 12)$

$= 26,238.58\ cm^3.$

Volume of bollard $= 3,619.11 + 26,238.58 = 29,857.69\ cm^3.$

2022 Paper 1 Question 3, (2)

Volume $= \frac{1}{3}\pi\ r^2\ h$

$= \frac{1}{3}\pi\ (10^2)\ (60)$

$= \frac{1}{3}\pi\ (100)\ (60)$

$= 2000\ \pi$

$= 2000\ x\ 3.14$

$= 6{,}280\ cm^3$

2022 Paper 2 Question 3, (3)

Volume of Sphere $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} x\ \pi\ x\ 0.2^3$

$= 0.0335\ m^3$

Volume of Cuboid $= l\ x\ b\ x\ h$

$= 0.48\ x\ 0.48\ x\ 2$

$= 0.4608\ m^3$

Total volume of concrete needed $= 0.0335 + 0.4608 = 0.4943\ m^3$

2023 Paper 2 Question 9, (4)

The block is a pyramid with a smaller pyramid removed from the top.

$$\text{Volume of large pyramid} = \frac{1}{3}\ x\ 90^2\ x\ 108$$
$$= 291{,}600\ cm^3$$

$$\text{Volume of small pyramid} = \frac{1}{3}\ x\ 40^2\ x\ 48$$
$$= 25{,}600\ cm^3$$

$$\text{Volume of block} = 291{,}600 - 25{,}600 = 266{,}000\ cm^3$$