Volumes - Credit Past Paper Solutions
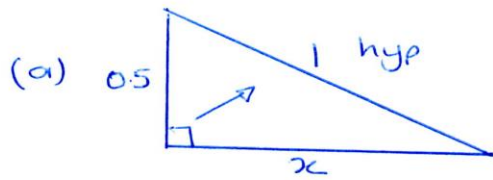
(1) 2010 Paper 2 Q5

Key words: cuboid, triangular prism, volume.

check units: all in m.

(a)

0.5, 1 hyp, x

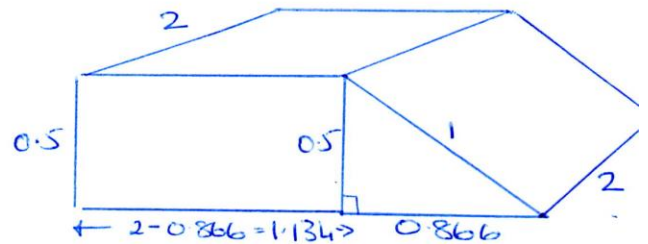(right-angled $\triangle$ -sides- pythagoras)

$x^2 = 1^2 - 0.5^2$ ✓

$x^2 = 0.75$ (2RE)

$x = 0.866$ m   (any rounding
                   - use at least
                   2 dps)

(b) • Volume of cuboid $= l \times b \times h$

2, 0.5, 0.5, 1, 2, ← 2-0.866=1.134 → 0.866

$= 1.134 \times 0.5 \times 2$

$= 1.134$ ✓

• Volume of triangular prism $= \frac{1}{2} \times l \times b \times h$

$= \frac{1}{2} \times 0.866 \times 0.5 \times 2$ ✓

$= 0.433$ (3RE)

• Total volume $= 1.134 + 0.433$

$= 1.567$ m^3 ✓ (any rounding)

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(2) 2009 Paper 2 Q2

Key words: cylinder, radius, height.

check units: litres, cm; remember 1ℓ = 1000 mL = 1000 cm^3
So work in cm^3. units tell you this is Volume.

• Volume of 1 glass $= \pi r^2 h$

$= \pi \times 3^2 \times 8$

$= 226.19$ ✓

• N° of glasses $= 2000 \div 226.19$

$= 8.84$ ✓

• Answer: ⇒ 8 full glasses. ✓

(4RE)

(3) Keywords: cylindrical, radius, height, volume, hemisphere, same.

units: all cm.

formulae: V of cylinder $= \pi r^2 h$.   V of hemisphere $= \frac{2}{3} \pi r^3$.

(a)   Vol of cylinder $= \pi r^2 h$ $r = 3cm$, $h = 4cm$

$$Vol = \pi \times 3^2 \times 4 \checkmark$$

$$Vol = 113.10 cm^3 (2dps) \checkmark \quad (2ku)$$

(b)   Vol of hemisphere $= \frac{2}{3} \pi r^3$. $V = 113.10$, $r = ?$

$$113.10 = \frac{2}{3} \times \pi \times r^3 \checkmark$$

$$113.10 = 2.09 \times r^3$$

$$r^3 = 113.10 \div 2.09$$

$$r^3 = 54.11 \checkmark$$

$$r = \sqrt[3]{54.11} \qquad (3RE)$$

$$r = 3.78 cm. \checkmark$$

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(4) <u>2006 Paper 2 Q7</u>

• key words: Prism, area of cross-section, volume, cylindrical, diameter, length.

• Units: cm, cm², mm ← change mm to cm.   14mm = 1. cm

• formulae: V = Ah,   V of cylinder $= \pi r^2 h$.

(a) V = Ah

    V = 28 × 18

    V = 504 cm³ ✓

    (1ku)

(b)   V $= \pi r^2 h$ (block is melted down

    $504 = \pi \times 0.7^2 \times h$ ✓ so volume is same as

    $504 = 1.54 \times h$ (a). h n formula is length)

    h = 504 ÷ 1.54 ✓

    h = 327.4 cm; length of cable = 327.4cm ✓

(5) <u>2003 Paper 2 Q4</u>

· key words: cylinder, diameter, height, volume, depth.
· units: cm, ml $\Rightarrow$ ok a $1cm^3 = 1ml$.
· Formulae: $V = \pi r^2 h$.

(a) $V = \pi r^2 h$
$V = \pi \times 5^2 \times 14$ ✓
$\underline{V = 1099.56 \, cm^3}$ ✓

(2ku)

(b) depth $\Rightarrow$ height of coffee.
$V = \pi r^2 h$ $V = 600, r = 5$
$600 = \pi \times 5^2 \times h$ ✓
$600 = 78.54 \times h$
$h = 600 \div 78.54$ ✓
$h = 7.64$, $\underline{depth = 7.6cm}$. ✓

(3RE)

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(6) <u>2002 Paper 2 Q5</u>

· key words: prism-shaped, uniform cross-section,
         rectangle, semi-circle, volume, sig. figs.
· units: all m.
· Formulae: Area of rectangle = lb, area of semi-circle = $\frac{1}{2}\pi r^2$
       Volume of prism = Ah.

· Area of rectangle = 0.6×0.25
           $= 0.15$ ✓

· Area of semi-circle $= \frac{1}{2} \times \pi \times 0.3^2$
           $= 0.14$ ✓

· Area of cross-section $= 0.15 + 0.14$
             $= 0.29$ ✓

· Volume $= 0.29 \times 4$
     $V = 1.16$ ✓
     $V = \underline{1.2 \, m^3}$ (2 sig figs) ✓

(5ku)

(7) **2001 Paper 2 Q.5**

key words: cylindrical, height, diameter, same volume.
          1 decimal place.

units: all cm.

formulae: $V = \pi r^2 h$.

- First can: $V = \pi r^2 h$ $h = 15cm$ $d = 6.5cm$
             $V = \pi \times 3.25^2 \times 15$
             $V = 497.75 \ cm^3$. ✓

- Second can: $V = \pi r^2 h$ $V = 497.75$, $h = 12cm$
         $497.75 = \pi \times r^2 \times 12$ ✓
         $497.75 = 37.70 \times r^2$
            $r^2 = 497.75 \div 37.70$
            $r^2 = 13.20$
            $r = \sqrt{13.20}$ ✓   (4 RE)
            <u>$r = 3.63cm$</u>.
       <u>diameter = 7.3 cm</u> (1dp) ✓

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(8) **2000 Paper 2 Q.10.**

key words: cuboid, square base, high, cylinder, radius, height
              Volume, space.

units: all cm.
formulae: V of cuboid = Lbh,   V of cylinder = $\pi r^2 h$.

- Volume of space = vol. of cylinder - vol. of cuboid.
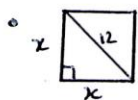
- Vol. of cylinder = $\pi r^2 h$ • Vol. of cuboid = l×b×h
           $= \pi \times 6^2 \times 20$ ✓ $= \sqrt{72} \times \sqrt{72} \times 20$
             $= 720\pi$ $= 1440$. ✓

-   Pythagoras: $x^2 + x^2 = 12^2$ ✓   • Vol of Space $= 720\pi - 1440$ ✓
                  $2x^2 = 144$ $= 720(\pi - 2) \ cm^3$
                   $x^2 = 72$
                   $x = \sqrt{72}$ ✓   (5 RE)
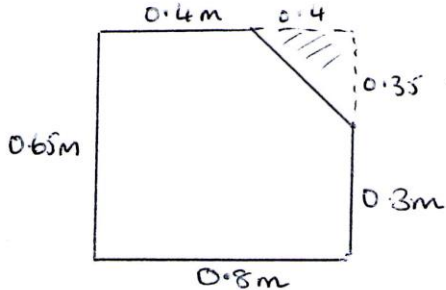
(9) <u>1999 Paper 2 Q7.</u>

key words: prism-shaped, uniform cross-section, Volume.

Units: cm, cubic metres ⇒ change lengths to m.

formulae: $V = Ah$. Area of rectangle = lb, A of triangle = $\frac{1}{2}bh$.

- Area of rectangle = 0.8×0.65

  $= 0.52 m^2$ ✓

- Area of shaded triangle $= \frac{1}{2} \times 0.4 \times 0.35$

  $= 0.07 m$. ✓

- Area of cross-section $= 0.59 m^2$ ✓

- Volume of Prism $= 0.59 \times 1$ (100cm = 1m)

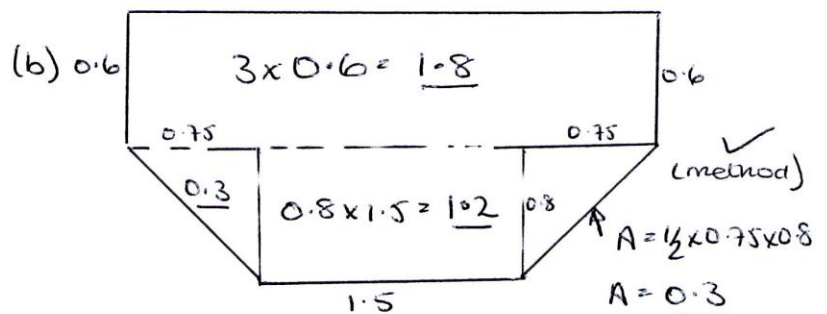 $\underline{Vol = 0.59\ m^3}$ ✓

    (4ku)

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(10) <u>1998 Paper 2 Q.2</u>

key words: prism, cross-section, volume.

units: all m.

Formulae: $V = Ah$, Area of rectangle = lb, area of triangle = $\frac{1}{2}bh$.

(a) $x = \frac{1}{2}$ of $(3 - 1.5)$

$\underline{x = 0.75}$ ✓

(b)

$3 \times 0.6 = 1.8$

$0.8 \times 1.5 = 1.2$

✓ (method)

$A = \frac{1}{2} \times 0.75 \times 0.8$

$\underline{A = 0.3}$

- Total Area of cross-section $= 1.8 + 1.2 + 0.3 + 0.3$

  $= 3.6 m^2$ ✓

- Volume of Prism $= 3.6 \times 2$ (4ku)

  $= \underline{7.2\ m^3}$ ✓

(11) 1997 Q.2

key words: prism, cross-section, rectangle, semi-circle,
          volume, sig-figs, increase, radius, width

units :   m, m³.

Formulae: V = Ah, Area of rectangle = lb, Area of triangle = ½bh
           Area of semi-circle = ½πr² .

(a) • Area of rectangle = 5×7   • Vol. of = 54·24 × 12 ✓
                        = 35   Barn = 650·88 ✓
    • Area of semi-circle = ½×π×3·5²   = 650 m³ (2sgf)
                        = 19·24. ✓   (4 ku)
    • total area = 54·24 ✓✓

(b) Extension volume = 200 m³. ✓

    Volume = (3w + ½ × 2×w) × 12.
      200 = 4w × 12 ✓
      200 = 48w
        w = 200 ÷ 48
        w = 4·2 m. ✓

                                        (3RE)

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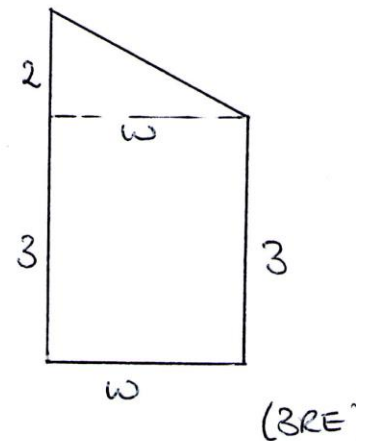
(12) 1996 Paper 2 Q2 .

key words: uniform cross-section, right-angled triangle,
          rectangle, volume

units: all m.

formulae: V = Ah, Area of rectangle = lb, Area of triangle = ½b

• Area of rectangle = 2×0·5   • Volume = 7 × 3
                    = 1   V = 21 m³. ✓
                         ✓
• Area of triangle = ½ × 6×2 (method)
                   = 6   (2ku)
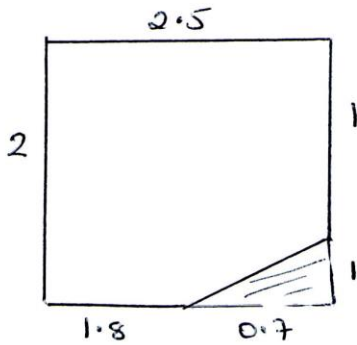
(13)   1994   Q14

Key words: prism, uniform cross-section, volume.

units: all m

formulae: V = Ah, area of rectangle =   area of triangle = ½bh

2.5

2

1.8   0.7

1

1

- Area of rectangle = 2 × 2.5 = 5   ✓   ✓
- Area of shaded triangle = ½ × 0.7 × 1 = 0.35
- Area of cross-section = 5 − 0.35
                                = 4.65 m²   ✓

- Volume = 4.65 × 2   (4ku)
  V = 9.3 m³   ✓