Year 10 Surface Area, Volume and Statistics Test

① Approximately how many spherical balls of diameter 0.5 cm could be made from a melted down cube of side length 5 cm?

- Ⓐ 19
- Ⓑ 190
- Ⓒ 1900
- Ⓓ 19 000

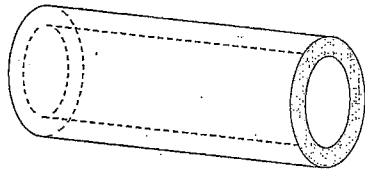② The volume of a cone with diameter 7 cm and height 8 cm is closest to

- Ⓐ 56 cm³
- Ⓑ 103 cm³
- Ⓒ 392 cm³
- Ⓓ 448 cm³

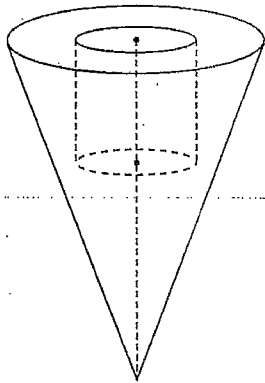③ The volume of a cylinder with diameter 5 m and height 4 m is closest to

- Ⓐ 57 m³
- Ⓑ 69 m³
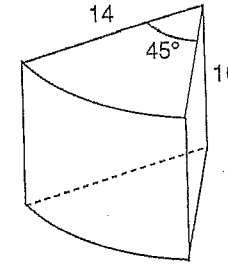- Ⓒ 79 m³
- Ⓓ 89 m³

④ Find the volume of:

a) Metal in a pipe 10 cm long, with inner radius $1\frac{1}{4}$ cm and outer radius $2\frac{1}{4}$ cm. (EXACTLY)

b) The metal in a solid cone of radius 1.4 cm and height 6 cm from which a cylinder of radius 0.7 cm and height 2 cm has been removed. (EXACTLY)

c) A piece of cheese with radius of sector 14 cm, depth 10 cm and angle 45°. (2 D.P.)

⑤ A spherical ball fits neatly into a cubical box and touches each of the six faces. What percentage of the volume of the box is occupied by the ball? (2 DP)

⑥ Metal ingots are in the shape of triangular prisms. Each triangular end is right-angled with two of the sides 7 cm and 24 cm. The other three faces are rectangles. Find:

a the length of an ingot whose volume is 504 cm³ (EXACTLY)

b the surface area of an ingot 60 cm long. (EXACTLY)
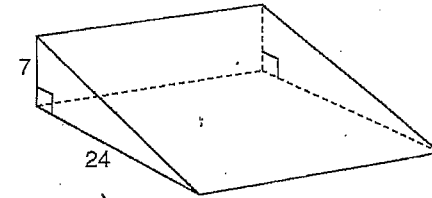
⑦ Calculate the surface area of:

a)
- 15 cm
- 12 cm
(EXACTLY)

b)
- TL = 8 cm
- LM = 10 cm
- LR = 4 cm
- MQ = 9 cm
(1. D.P.)
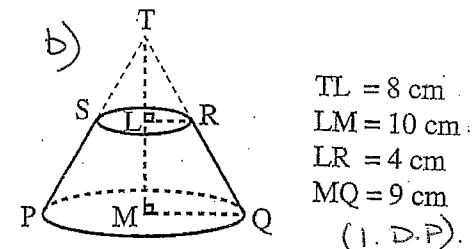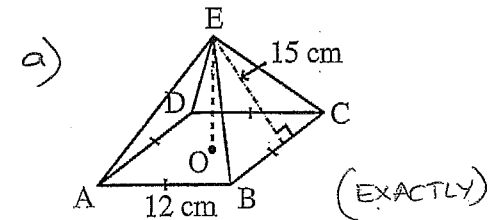
⑧ A sphere has a surface area of 360 cm². Find its radius correct to two decimal places (EXACTLY   SIMPLIFIED)

9. Find the mean, range and standard deviation (to 1dp) of the following set of scores:

a)
```
21  20  25  26  27  22
16  17  13  22  23  29
10  12  15  28  22  32
```

b)
```
73  75  79  69  70  72
78  84  68  75  78  80
72  72  74  77  70  76
83  67  72  75  81  74
```

10. These box-and-whisker plots show the results obtained by the same group of students on the ELLA tests, when they were in years 7 and 8.

a Construct a five-point summary for each data set.

b Calculate the interquartile range for each data set.

c Comment on the change that can be seen in the students' results.

ELLA results—years 7 and 8


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0  10 20 30 40 50 60 70 80 90 100
              Test score
```
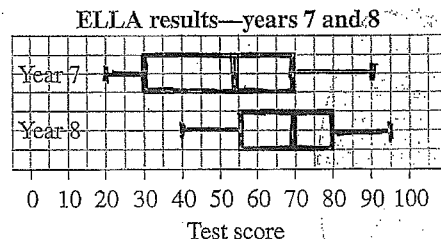
11. The table below shows the number of days on which it rained in two towns, over a 12 month period.

Month	J	F	M	A	M	J	J	A	S	O	N	D
Castledon	11	3	7	6	7	7	5	6	8	6	3	5
Renville	3	4	4	8	10	11	10	5	9	7	7	5

a Draw a box-and-whisker plot for each data set, on the same scale.

b Find the standard deviation for each data set, correct to 1 decimal place.

c The residents of Renville claim that their town has many more rainy days than Castledon. Does the data support this argument?

12. The number of seeds in two types of watermelon was counted in 10 watermelons of each type. The results are recorded below.

Type A	63	45	90	42	55	71	80	62	75	68
Type B	92	79	84	98	100	72	80	99	110	85

(i) Calculate the mean and standard deviation of the number of seeds of each type of watermelon.

(ii) Which type has the more consistent number of seeds? Give a reason for your answer.

MATHS 10:C CLASS TEST 2010

NAME _____   MARK $53\frac{1}{2}$ 54

Leave a line between each answer.
SHOW FULL WORKING.

1.
Cube = $125 \, cm^3$

~~Volume~~ Answer = Ⓒ ✓

2.
Answer = Ⓑ ✓

3.
Answer = Ⓒ ✓

4.

(a) Cross section: $\pi \times 2.25^2 - \pi \times 1.25^2$

$= 5.0625\pi - 1.5625\pi$

$= 3.5\pi$ ✗

$V = 3.5\pi \times 10 \, cm$

$V = 35\pi \, cm^3$ ✓   ③

(b) Volume of cone $= \frac{1}{3} \times \pi \times 1.4^2 \times 6$

$= \frac{11.76\pi}{3}$

Volume of cylinder $= \pi \times 0.7^2 \times 2 = 0.98\pi$

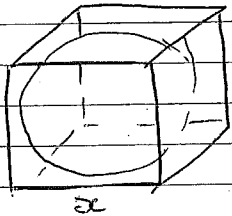Metal in solid $= \frac{11.76\pi}{3} - 0.98\pi$

$= 2.94\pi \, cm^3$ ✓   ③

(c) Area of sector: $\dfrac{45}{360} \times \pi \times 14^2$

Volume: $\dfrac{1}{8} \times \pi \times 14^2 \times 10$

Volume = 769.69 cm^3 ✓ ②

5.

Let box side be ~~was~~ 2

diameter = ~~2~~ 2

radius = ~~2~~ 1

V of cube = ~~2³~~ 8^3

V of sphere = $\dfrac{4}{3} \times \pi \times 1^3$

$\qquad = \dfrac{4 \times \pi \times 1}{3}$

$\qquad = \dfrac{4\pi}{3}$

$\qquad = \dfrac{4\pi}{3}$

~~$\frac{4\pi}{4} \times 100$~~ $\qquad \dfrac{\frac{4\pi}{3}}{8} \times 100 = 52.36 \text{ \%}$ ④

6.

a) Cross section: $7 \times 24 \times \dfrac{1}{2} = 84 \text{ cm}^2$

$504 \text{ cm}^3 \div 84 \text{ cm}^2$ ✓

$L = 6 \text{ cm}$ ✓ ②

(b) Front and Back: $2 \times (84 \text{ cm}^2)$

Left: 7×60

Bottom: 24×60

Top = 25×60 ✓ ③

Surface area = 3528 cm^2 ✓

7.

a) $12 \times 12 + 2 \times 15 \times 12$

$= 144 + 360 \text{ cm}^2$

$= 504 \text{ cm}^2$ ✓ ②

(b) Surface area of whole cone (curved area)

$= \pi \times 9 \times \sqrt{405}$

surface area of cut off bit (curved area)

$= \pi \times 4 \times \sqrt{80}$

Surface area of truncated cone: $\pi \times 9^2 + (9\pi\sqrt{405} - 4\pi\sqrt{80}) + \pi \times 4^2$

$= 761.3 \text{ cm}^2$ ✓ ④

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8. $4\pi r^2 = 360 \text{ cm}^2$

$\pi r^2 = 90 \text{ cm}^2$

$r^2 = \dfrac{90}{\pi}$

$r = \sqrt{\dfrac{90}{\pi}}$

$r = \dfrac{3\sqrt{10}}{\sqrt{\pi}}$ ✓ $2\frac{1}{2}$

9.

(a) Mean = 21.1 ✓   (b) Mean = 74.8 ✓

Range = 22 ✓   Range = 17 ✓

σ_n = 6.1 ✓ σ_n = 4.5 ✓

10.

(a) Year 7: 20, 30, 55, 70, 90 ✓
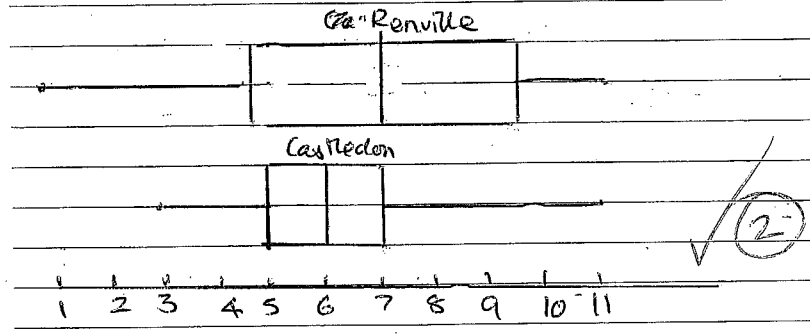
Year 8: 40, 55, 70, 80, 95 ✓

$\dfrac{84}{2}$

(b) Year 7 : 70 - 30 = 40 ✓

Year 8 : 80 - 55 = 25 ✓

(c) As students progress into Yr 8, they do much better, and are more consistent. The mean is higher, the Inter Quartile range is lower, the lowest score is higher and the highest score is higher. ✓ ②

11

(a) FPS 2 Castledon : 3, 5, 6, 7, 11

FPS Renville : 1, 4.5, 7, 9.5, 11

(b) $\overset{2.1}{\bar{x}}$ C (Castledon) ✓

$\bar{x}$ 3.0 (Renville) ✓

(c) No as renville has more rainy days on mean and has higher S.D. ✓

12.

(i) Type A : $\bar{x}$ = 65.1 ✓

σ_n = 14.3 ✓

Type B : $\bar{x}$ = 89.9 ✓

σ_n = 11.2 ✓

(ii) Type A, Type B, Less Standard Deviation. ✓