Measurement: Surface Area, Volume & Scaling (Grade 10)

EXAM-STYLE CLASS TEST

MARKS	DURATION	QUESTIONS
42	1 hour 5 minutes	4

Name: _____ Class: _____

Date: _____

MARK ____ / 42

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions in this question paper.
2. Answer QUESTION 1 by **circling** the letter (A–D) in the answer grid at the end of that section.
3. Show **ALL** calculations clearly.
4. Show all units where applicable.
5. Number the answers correctly according to the numbering system used in this question paper.
6. A non-programmable calculator may be used, unless stated otherwise.
7. Write neatly and legibly.

QUESTION 1 [10 MARKS]

Four options are given as possible answers to the following questions. Choose the correct answer and circle the letter (A–D) in the grid at the end of this section. If you want to change your choice, put a cross through the wrong letter and circle your new choice.

1.1 A cylinder has radius 5 cm and height 10 cm. Its VOLUME is ... (1)

A) 314,16 cm^3 **B)** 785,40 cm^3

C) 1 570,80 cm^3 **D)** 157,08 cm^3

1.2 A sphere has radius 6 cm. Its VOLUME is ... (1)

A) 904,78 cm^3 **B)** 150,80 cm^3

C) 678,58 cm^3 **D)** 452,39 cm^3

1.3 A cone has radius 3 cm and perpendicular height 8 cm. Its VOLUME is ... (1)

A) 75,40 cm^3 **B)** 226,19 cm^3

C) 150,80 cm^3 **D)** 25,13 cm^3

1.4 A closed cylinder has radius 4 cm and height 10 cm. Its TOTAL SURFACE AREA is ... (1)

A) 301,59 cm^2 **B)** 100,53 cm^2

C) 351,86 cm^2 **D)** 251,33 cm^2

1.5 If every dimension of a solid is multiplied by 3, its VOLUME is multiplied by ... (1)

A) 9 **B)** 6

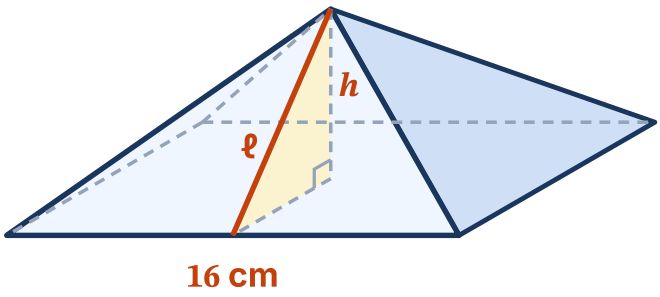
C) 27 **D)** 3

1.6 If every dimension of a solid is HALVED, its SURFACE AREA is multiplied by ... (1)

A) 4 **B)** $\frac{1}{2}$

C) $\frac{1}{8}$ **D)** $\frac{1}{4}$

1.7 A right pyramid has a square base of side 16 cm, a perpendicular height $h = 6$ cm and a slant height $\ell = 10$ cm, as in the diagram. Its TOTAL SURFACE AREA is ... (1)



A) 448 cm^2 **B)** 576 cm^2

C) 320 cm^2 **D)** 896 cm^2

1.8 A cube has volume 125 cm^3. Its TOTAL SURFACE AREA is ... (1)

A) 30 cm^2 **B)** 750 cm^2

C) 150 cm^2 **D)** 25 cm^2

1.9 A cylindrical tank has radius $0{,}5$ m and height 2 m. Its capacity is ... (1)

A) $157{,}08$ litres **B)** $1{,}57$ litres

C) $15{,}71$ litres **D)** $1\ 570{,}80$ litres

1.10 A square pyramid has base side 6 cm and perpendicular height 10 cm. Its VOLUME is ... (1)

A) 60 cm^3 **B)** 360 cm^3

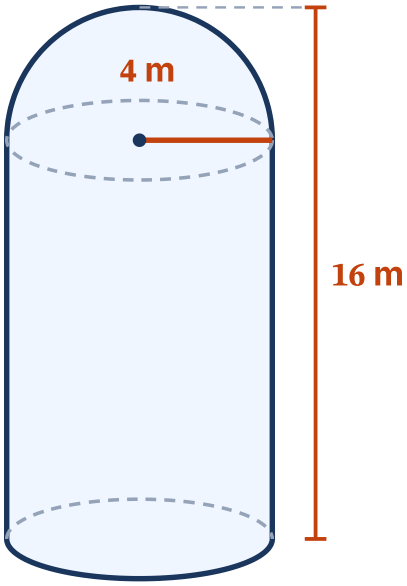
C) 20 cm^3 **D)** 120 cm^3

ANSWER GRID — CIRCLE YOUR ANSWERS FOR QUESTION 1

1.1	A	B	C	D
1.2	A	B	C	D
1.3	A	B	C	D
1.4	A	B	C	D
1.5	A	B	C	D
1.6	A	B	C	D
1.7	A	B	C	D
1.8	A	B	C	D
1.9	A	B	C	D
1.10	A	B	C	D

QUESTION 2 **[10 MARKS]**

A grain silo is made of a right cylinder with a hemispherical roof, as in the diagram below. The radius of the silo is 4 m and its total height, from the floor to the top of the roof, is 16 m. Round off your answers to TWO decimal places.

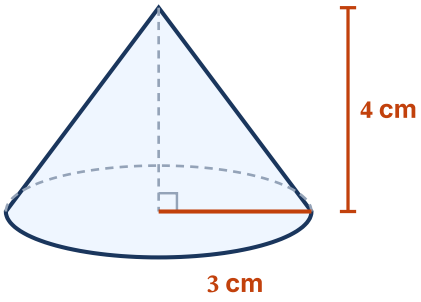


2.1 Calculate the volume of the silo. **(5)**

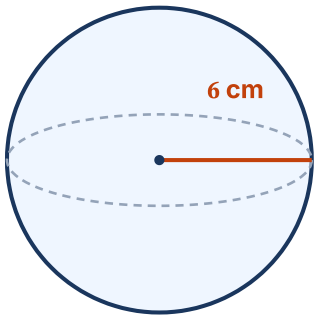
2.2 The walls and the roof are covered with metal sheeting; the floor is concrete. Calculate the area of sheeting needed, and explain why the circle where the roof meets the walls is not included. **(5)**

QUESTION 3 [13 MARKS]

The diagram below shows a cone with a base radius of 3 cm and a perpendicular height of 4 cm, and a sphere with a radius of 6 cm. Use $\pi \approx 3{,}14$, $V_{cone} = \frac{1}{3}\pi r^2 h$, $V_{sphere} = \frac{4}{3}\pi r^3$ and $SA_{sphere} = 4\pi r^2$.



cone (not to scale)



sphere (not to scale)

3.1 Calculate the volume of the cone. **(3)**

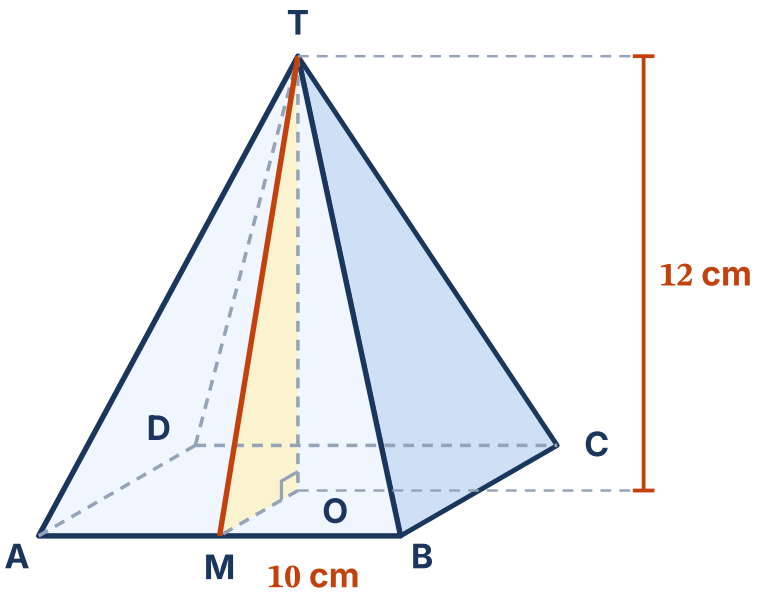
3.2 Calculate the volume and the surface area of the sphere. **(4)**

3.3 ALL the dimensions of the cone are doubled. Determine by what factor its volume increases, and justify your answer. **(4)**

3.4 Explain why doubling the dimensions multiplies the SURFACE AREA by only 4. **(2)**

QUESTION 4 [9 MARKS]

The diagram below shows a right pyramid TABCD with a square base ABCD. O is the centre of the base and M is the midpoint of AB. AB = 10 cm and the perpendicular height TO = 12 cm.



4.1 Show that the slant height TM = 13 cm. **(3)**

4.2 Calculate the total surface area of the pyramid. **(3)**

4.3 Calculate the volume of the pyramid, and explain why TO, and not TM, is used. **(3)**

TOTAL: 42 marks

This question paper consists of 4 questions.

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