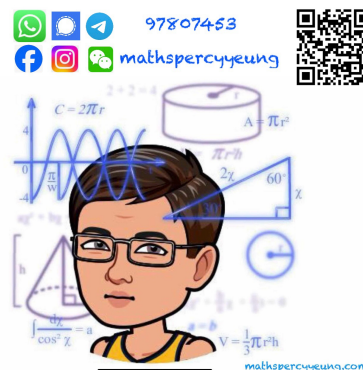


MSC F3 2020-2021 Second Term Form Test

2020-2021 Second Term Form Test

F.3 Mathematics



Time allowed : 45 minutes

Full mark : 45

This question-answer book consists of 8 printed pages.

Instructions to candidates:

1. This paper must be answered in English with a blue / black ball pen, unless otherwise specified.
2. Write your name, class and class number in the space provided on this cover.
1. This paper consists of TWO sections, A and B.
Section A carries 20 marks and Section B carries 25 marks.
2. Answer ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.
3. Mark the answers for Section A on page 4 with an HB pencil as follows:

CORRECT:	INCORRECT:
23. <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	23. <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
	23. <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>

Wrong marks should be completely erased with a clean rubber.

Choose the best answer for each question. All questions carry equal marks in Section A.

4. All diagrams / graphs / charts as part of the answers must be clearly drawn with an HB pencil.
5. Graph paper and supplementary answer sheets will be supplied on request. Write your name, class and class number on each sheet, and fasten them INSIDE this book.
6. Unless otherwise specified, all working must be clearly shown in Section B.
7. The diagrams in this paper are not necessarily drawn to scale.
8. Unless otherwise specified, numerical answers must be exact or correct to 3 significant figures.
9. Calculator pad printed with the “HKEA Approved” / “HKEAA Approved” label is allowed.
Remove the calculator cover / jacket.

Section A (20 marks)

1. It is given that a square based pyramid and a cube have the same base of side 18 cm. If the volume of the pyramid is half of the volume of the cube, find the height of the pyramid.
 - A. 18 cm
 - B. 27 cm
 - C. 30 cm
 - D. 36 cm
2. The height of a bucket in the shape of a frustum of a right circular cone is 25 cm. The upper base radius and lower base radius of the bucket are 14 cm and 7 cm respectively. Find its capacity correct to the nearest L.
 - A. 6 L
 - B. 8 L
 - C. 9 L
 - D. 10 L
3. A right circular cone is cut into two portions A and B by a plane parallel to its base such that the slant heights of the two portions are 3 cm and 5 cm respectively. Find the ratio of the curved surface area of A to that of B .
 - A. 9 : 55
 - B. 9 : 64
 - C. 27 : 485
 - D. 27 : 512
4. If $a > b > 0$, find the distance between two points $M(a+b, x+y)$ and $N(a-b, x+y)$.
 - A. $2a$
 - B. $2b$
 - C. $\sqrt{a^2 - b^2}$
 - D. $\sqrt{a+b}$
5. If the straight line passing through $A(-3,7)$ and $B(6,-2)$ intersects the y -axis at a point P , then $AP : PB =$
 - A. 1 : 2.
 - B. 2 : 1.
 - C. 7 : 2.
 - D. 2 : 7.

Answers written in the margins will not be marked.

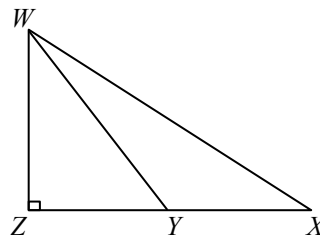
Answers written in the margins will not be marked.

6. $ABCD$ is a parallelogram. The coordinates of A , B and C are $(1,1)$, $(2,7)$ and $(-1,0)$ respectively. Find the coordinates of D .
- A. $(0,5)$
 B. $(0,6)$
 C. $(-2,-5)$
 D. $(-2,-6)$

7. Find the perimeter of the right-angled triangle ABC , where $AB = 4$ cm, $\angle ABC = 90^\circ$ and $\angle BAC = 60^\circ$.
- A. 8 cm
 B. $4(\sqrt{2} + \sqrt{3})$ cm
 C. $4(1 + \sqrt{2} + \sqrt{3})$ cm
 D. $4(3 + \sqrt{3})$ cm

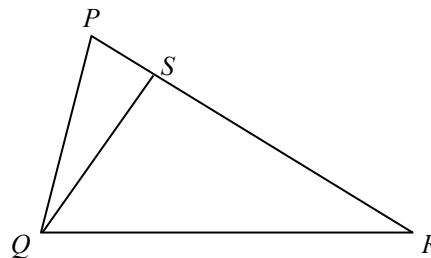
8. In the figure, XYZ is a straight line. It is given that $XY = YZ$, $\angle WZY = 90^\circ$ and $\angle WXZ = 30^\circ$.
 $\tan \angle YWZ =$

- A. $\frac{1}{\sqrt{3}}$
 B. $\frac{\sqrt{3}}{2}$
 C. $\frac{2}{\sqrt{3}}$
 D. $\sqrt{3}$



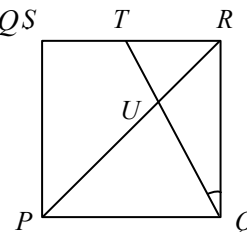
9. In the figure, S is a point on PR such that $QS \perp PR$. If $PQ = 7$ cm, $\angle QPR = 60^\circ$ and $\angle SQR = 45^\circ$, find the length of QR .

- A. $7\sqrt{2}$ cm
 B. $\frac{7\sqrt{2}}{2}$ cm
 C. $\frac{7\sqrt{6}}{2}$ cm
 D. $7\sqrt{6}$ cm



10. In the figure, $PQRS$ is a square. T is a point lying on RS such that $\angle TQR = 30^\circ$. PR and QT intersect at U . Find the ratio of the area of $\triangle TUR$ to the area of $\triangle PUQS$

- A. $1:\sqrt{3}$
 B. $1:\sqrt{2}$
 C. 1:2
 D. 1:3



Use a pencil to mark your answer as follows:

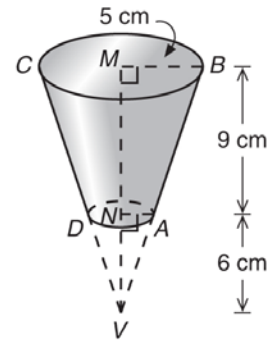
A
 B
 C
 D

- | | A | B | C | D | | A | B | C | D |
|----|--------------------------|--------------------------|--------------------------|--------------------------|-----|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Section B (25 marks)

1. The figure shows a frustum $ABCD$ of a right circular cone with vertex V . M and N are centres of the upper base and lower base respectively. The radius of the upper base is 5 cm, $MN = 9$ cm and $NV = 6$ cm.

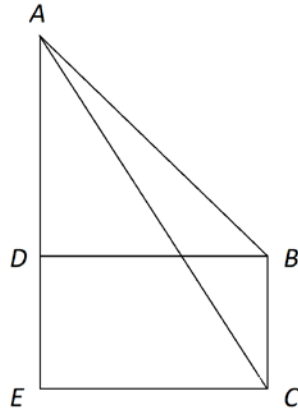
- (a) Find the radius of the lower base of the frustum. (2 marks)
- (b) Find the total surface area of the frustum. (3 marks)



Answers written in the margins will not be marked.

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2. In the figure, $CBDE$ is a rectangle and ADE is a straight line. It is given that $AD = a$, $\angle ABD = 45^\circ$ and $\angle CAE = 30^\circ$. Find the length of BC in terms of a . (5 marks)



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3. A trapezium $ABCD$ with coordinates $A(0,8)$, $B(21,15)$, $C(40,c)$ and $D(7,-3)$ is given, where $AB \parallel CD$.

(a) Sketch the figure in the box below.

(1 mark)



(b) Find the value of c .

(2 marks)

(c) A line is drawn from A to a point $E(4,e)$ on CD produced.

(i) Find the ratio of $ED : DC$.

(ii) Is AE perpendicular to CD ?

(iii) Find the area of trapezium $ABCD$.

(7 marks)

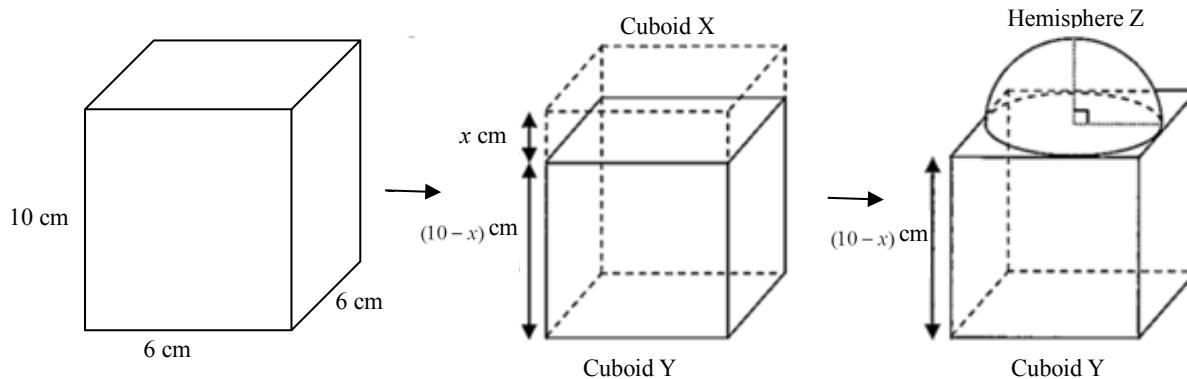
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4. Cuboid Y of height $(10 - x)$ cm is made by cutting out Cuboid X of height x cm from a larger cuboid with square base of sides 6 cm and height 10 cm. The cutting out part Cuboid X is then melted and recast into Hemisphere Z with radius 3 cm. Solid W is formed by fixing Hemisphere Z onto the Cuboid Y so that all centres are on a vertical line.



- (a) Find the value of x in terms of π . (3 marks)
- (b) If Solid W is cut into four identical parts, along planes passing through axes of symmetry of Solid W, find the increase in the total surface area of Solid W before and after the cut correct to the nearest cm^2 . (2 marks)

End of Paper