



CRANBROOK
SCHOOL

**Year 10 5.2/5.3 & 9 Accelerated
Mathematics - 2012 - TERM 3**

Term 3 Assessment Task

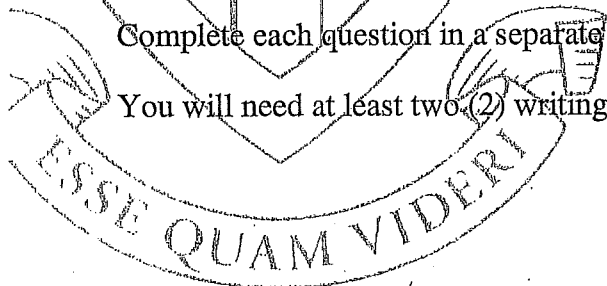
Part A

Time Allowed: 50 minutes

Total Marks: 40 marks

Complete each question in a separate writing booklet.

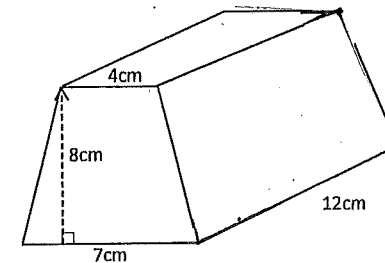
You will need at least two (2) writing booklets



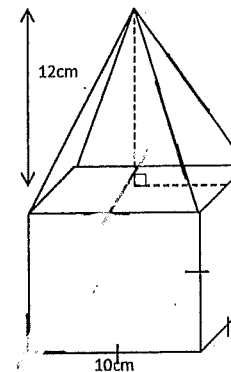
Question 1 Surface Area and Volume, Data and Deductive Geometry / 15 Marks

Start a new booklet

a) Find the volume of the figure below. 2



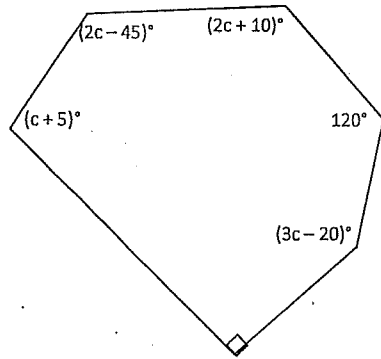
b) Find the surface area of the following figures. 3



c) The height of a cone is twice its radius.
If the total volume of the cone is $36\pi\text{cm}^3$, find the length of the radius correct to one decimal place. 2

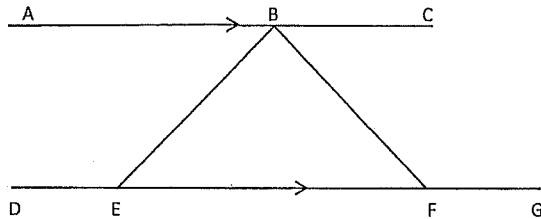
d) Find the value of c .

2



e)

- i) Copy the diagram below in to your writing booklet.
- ii) Using the diagram or otherwise, prove that the angle sum of a triangle is 180° (you must give reasons). 2



For the following data set, find the:

- i) Values of **A** and **B**.
- ii) Range
- iii) Mean

1
1
1

| | | |
|---|----------------|-----------------|
| 2 | 2 | 4 |
| 3 | 8 | 24 |
| 4 | 12 | 48 |
| 5 | 19 | 95 |
| 6 | 7 | 42 |
| 7 | 3 | 21 |
| | $\Sigma f = A$ | $\Sigma fx = B$ |

End of Question 1.

Prepare to start a new booklet.

Question 2

Trigonometry

25 Marks

Start a new booklet

a)

- i) Draw a right angled triangle where $\sin \alpha = \frac{6}{7}$ 1
- ii) Using the triangle in i) find the EXACT value of $\tan \alpha$ 2

b) Find the exact value of:

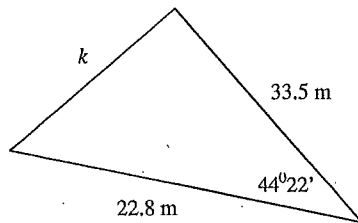
- i) $\cos 30^\circ \times \sin 30^\circ$ 2
- ii) $\cos 225^\circ$ 1

c) Solve the following equations leaving answers in exact form where possible

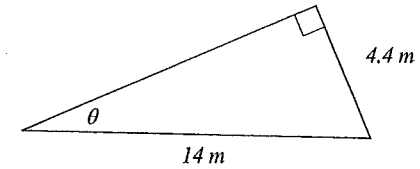
- i) $\tan \theta = -1$ $0 \leq \theta \leq 360^\circ$ 2
- ii) $\sqrt{3} = 2 \cos \beta$ $0 \leq \beta \leq 360^\circ$ 2

d) Find the value of the pronumeral in each triangle

- i) 3

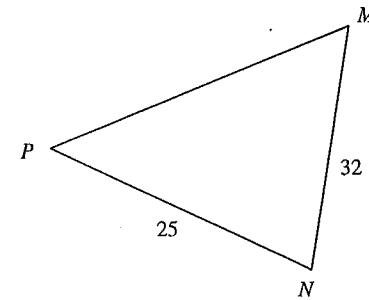


ii)



2

e) The area of a $\triangle MNP$ is $200\sqrt{3} \text{ m}^2$.



- i) Find the value(s) of $\angle MNP$ 3
- ii) The length of PN is changed so that $\angle MNP = 135^\circ$ but the area remains the same. Find the new length of PN 3

f) In triangle ABC, AC is 3.2 m long and BC is 5 m long.

- i) Draw a diagram of triangle ABC 1
- ii) Find the value(s) of $\angle ABC$ if $\angle BAC$ is 47° . 3

End of Examination.



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Year 10 5.2/5.3 & 9 Accelerated Mathematics

Term 3 Assessment Task

Part B

Time Allowed: 50 minutes

Total Marks: 40 marks

Complete each question in a separate writing booklet.

You will need at least two (2) writing booklets

Question 1 Consumer Arithmetic and Probability

15 Marks

Start a new booklet

- a) How much would \$300 be worth if it was invested for 3 years in an account with an interest rate of 8% p.a., compounded quarterly? 2
- b) Martin bought a Corvette 15 years ago. It is currently worth \$15 000. If he calculated that it depreciated at a rate of 4.5% p.a, what was its original value? 2
- c) Julia bought a stereo system valued at \$2200. She bought on terms with no deposit and equal monthly repayments of \$90 for 3 years.
- i) Calculate the total amount that Julia paid for the system. 1
 - ii) Calculate the interest she paid. 1
 - iii) What is the annual simple interest rate that Julia would have paid? 2
- d) Consider a standard deck of cards that contains no jokers. A student pulls out one card from the deck.
- i) What is the probability of pulling out a 3? 1
 - ii) What is the probability of pulling out an even numbered card? 1
- e) A bag contains 3 pink marbles, 4 blue marbles and 5 green marbles.
- i) A marble is removed from the bag. What is the probability it is pink? 1
 - ii) Two marbles are removed *with* replacement.
What is the probability that they are both blue? Show all working. 2
 - iii) Two marbles are removed *without* replacement.
What is the probability that they are both green? Show all working. 2

End of Question 1.

Prepare to start a new booklet.

Question 2 Curve Sketching, Factorising and the Quadratic Function 25 Marks

Start a new booklet

- a) Fully factorise $abx^2 - a^3b$ 2
- b) Solve $x^2 - 4x + 2 = 0$ by completing the square 2
- c) Solve $2a^2 + 7a - 15 = 0$ by factorising 2
- d) Solve $\frac{3(x+1)}{x} = x$ using the quadratic formula 2
- e) Simplify $\frac{6}{3x+3y} - \frac{x}{x^2+xy}$ 3
- f) Sketch the following functions on separate sets of axes clearly showing any asymptotes and one point which lies on the curve
- i) $y = x^2 + 4$ 2
- ii) $xy = 2$ 2
- iii) $y = 2^{-x}$ 2
- g) Consider the function $y = x^2 + 2x - 15$
- i) State the y-intercept 1
- ii) Find the x-intercepts 2
- iii) Give the equation of the function's axis of symmetry 1
- iv) Find the coordinates of the vertex 2
- v) Sketch the curve showing all these essential features 2

End of Examination.

2012 EXAM SOL'NS.

PART A →

Question | Surface Area | Volume | Solutions

a) $V = A \times h$ $A = \frac{h}{2}(a+b)$
 $\quad \quad \quad \quad \quad = 4(7+7)$
 $\quad \quad \quad \quad \quad = 44 \text{ cm}^2$

$V = 44 \times 12$
 $\quad = 528 \text{ cm}^3$

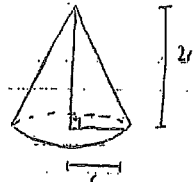
b) Pyramid has 4 triangles, each with base = 10cm
 Height of triangle = $\sqrt{12^2 + 5^2}$
 $\quad \quad \quad \quad \quad = 13 \text{ cm}$

$\therefore \text{Area} = \frac{10 \times 13}{2} = 65 \text{ cm}^2$

$\therefore \text{Surface Area} = 4 \times 65 + 5 \times (10 \times 10)$
 the faces of the cube

$= 760 \text{ cm}^2$

c)



$V = \frac{1}{3} \pi r^2 h$
 $\quad = \frac{1}{3} \pi \times r^2 \times 2r$
 $\quad = \frac{2}{3} r^3 \pi$

$V = 36\pi$

$\therefore 36 = \frac{2}{3} r^3$

$r^3 = \frac{3}{2} \times 36$

$= 54$

$\therefore r = 3.8 \text{ cm}$

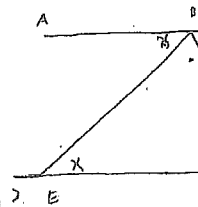
1) Six sided \angle Angle sum = 4×180
 $\quad \quad \quad \quad \quad = 720$

$\therefore 720 = (x+5) + (2x-45) + (2x+10) + 120 + 3x-20 + 90$

$= 8x + 160$

$8x = 560$

$x = 70^\circ$



$\therefore \angle EBF =$

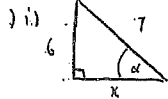
Angle

f) i) $A = 8$
 $B = 4$

ii) Range

iii) $\frac{234}{51}$

Year 10 Term 3 exam - Solutions



i)

① Correct triangle

c) ii)

ii) $x^2 = 7^2 - 6^2$

$= 13$

$\therefore x = \sqrt{13}$

$\tan \alpha = \frac{6}{\sqrt{13}}$ or $\frac{6\sqrt{13}}{13}$

① Finding the missing side.

① EXACT value of $\tan \alpha$.

You of

b) i) $\frac{\sqrt{3}}{2} \times \frac{1}{2} = \frac{\sqrt{3}}{4}$

① Correct exact values.

d)

ii) $\cos 225 = -\frac{1}{\sqrt{2}}$

① Correct value
① Negative.

①

NB b) i) is worth 1 mark and ii) is worth 2.

①

c) $\tan \theta = -1$

$\theta = 135^\circ, 315^\circ$

① for each correct answer.

① 6

Plenty by

No marks given for 45° or -45° , both are wrong and show a lack of understanding of the question

c) ii) $\sqrt{3} = 2 \cos \beta$

Triangle

$\cos \beta = \frac{\sqrt{3}}{2}$

the missing

$\beta = 30^\circ, 330^\circ$

① for each correct solution.

value of

You can not take the 'inverse cos' of both sides of the equation before dividing both sides by 2.

d) $h^2 = (22.8)^2 + (33.5)^2 - 2 \times 22.8 \times 33.5 \times \cos 49^\circ 22'$
 $= 550.039913...$

$\therefore h = 23.45 \text{ km (2dp)}$

① Using the cosine rule

worth 2.

① Correct substitution

① Correct answer

Plenty of students subtracted before multiplying by $\cos 49^\circ 22'$. Basic order of operations error.

correct

both of

ii)

$$\sin \theta = \frac{4.4}{14}$$

$$\therefore \theta = \sin^{-1} \left[\frac{4.4}{14} \right]$$

$$= 18^{\circ} 19'$$

① Using right angled trig or the sine rule

① Correct answer

f) i) 3.2

c

e) \therefore Area = $\frac{1}{2} ab \sin C$

① Correct formula

$$200\sqrt{3} = \frac{1}{2} \times 25 \times 32 \times \sin C$$

① Substitution

$$\sin C = \frac{\sqrt{3}}{2}$$

However,

$$C = 60^{\circ} \text{ or } 120^{\circ}$$

① Both answers

ii)

$$200\sqrt{3} = \frac{1}{2} \times 32 \times PN \times \sin 135^{\circ}$$

① Correct substitution

$$200\sqrt{3} = \frac{16}{\sqrt{2}} \times PN$$

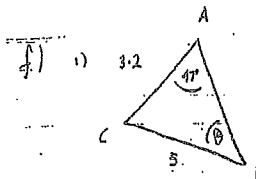
① Solving steps

$$\frac{200\sqrt{6}}{16} = PN$$

① Correct answer

$$PN = 30.62 \text{ units}$$

right angled at the sine



① All information

answer

$$\frac{\sin \theta}{3.2} = \frac{\sin 47^{\circ}}{5}$$

① Using sine rule correctly

f formula

$$\sin \theta = 0.468...$$

$$= 27^{\circ} 55' \text{ or } 152^{\circ} 5'$$

① Answer

rejection

However, $152^{\circ} 5'$ is too large to fit in $\triangle ABC$

$$\therefore \theta = 27^{\circ} 55'$$

① For finding both answers but eliminating $152^{\circ} 5'$ with a reason.

answers

Correct substitution

steps

f answer