

## **SECTION A: Practice Questions on Arithmetic**

1. How many significant figures does each of the following numbers have?
  - a) 0.001230
  - b) 45.02
  - c) 345.0
  - d) 45 000
2. Round off 6 999 to two significant figures.
3. There are 40 oranges and 24 apples in a basket. How many percent more oranges than apples are there?

### **Reference:**

*Algebra Resources for Secondary School Teachers*, McGraw-Hill (Singapore), 2006.  
available in NIE Bookshop.

*All the following references refer to the above book, which is available in NIE Bookshop.*

Note that all the following pages refer to the above reference book.

4. **More about the Number System**  
Pg 14, Q1, Q2 and Q3.
5. **Numbers under Arithmetic Operations**  
Pg 22, Q1; Pg 23, Q3, 4, 5, 6 and 7.
6. **Decimal Numbers**  
Pg 29, Q1, 3 and 4.
7. **More about Prime Numbers**  
Pg 38, Q1; Pg 39, Q2, 3, 4 and 5.
8. **More about Integers**  
Pg 51, Q4, 5 and 6.

## **SECTION B: Algebra**

1. **Algebraic Expressions**  
Pg 55 to 56: Q1 to 6.
2. **Quadratic Expressions**  
Pg 61 to 62: Q1 to 4

3. **Algebraic Functions**

Pg 71: Q8 to 11

4. **Algebraic Equations**

Pg 78 to 79: 1, 2, 3, 4, 5, 6

**Erratum (Pg 78):**

The equation in Q2 should read as “ $x^3 + 3x^2 + 2 = 0$ ”.

Part (c) of Q2 should be  $\frac{3}{\beta} + \frac{2}{\beta^3}$

Part (d) of Q2 should be “given that  $\alpha^2 + \beta^2 = 0$ ”.

5. **Sketching of Graphs**

Pg 87: Q1, 2

Pg 88: Q3

Pg 89: Q8, 9 and 10

6. **Inequalities**

Pg 99 to 101: Q1 to 9

7. **Basic Probability Reasoning**

Pg 106 to 107: Q1 to 7

8. **Basic Matrix Algebra**

Pg 112 to 114: Q1 to 5

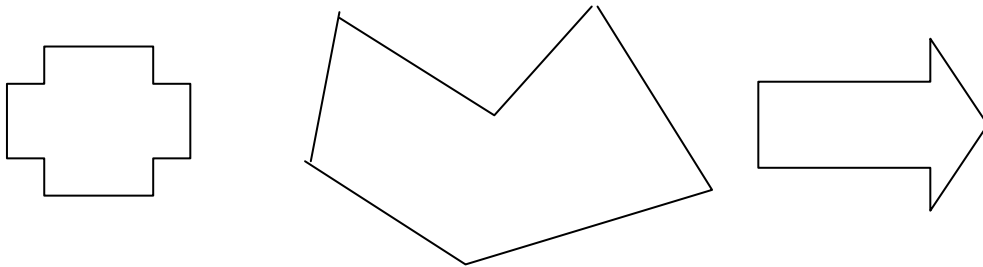
**Erratum (Pg 113)**

In Q2(b), the matrix should be  $\begin{pmatrix} a & 0 \\ 0 & a \end{pmatrix}$  instead of  $\begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$

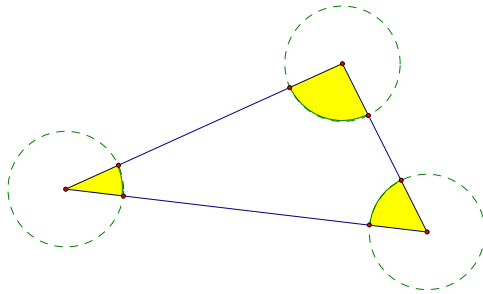
## SECTION C: Geometry & Mensuration

### Angles

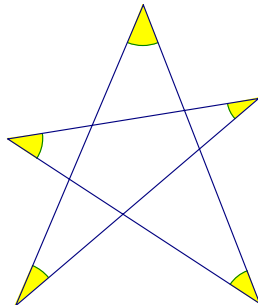
1. Mark all the interior angles of the following polygons and calculate the sum of (interior) angles of the following polygons:



2. Given a triangle where a unit circle is drawn with each vertex as the centre. Calculate the total area of the shaded region in the following diagram.

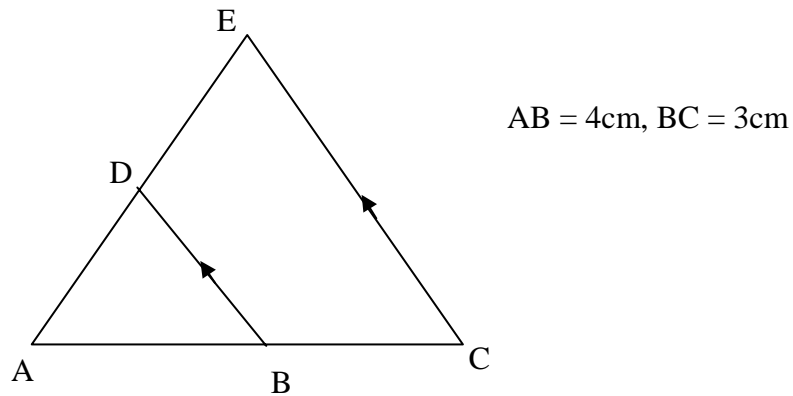


3. Calculate the total angles of the star shaded in the following diagram. Show your working / explanation clearly.



### Congruency/Similarity Tests for Triangles and Applications

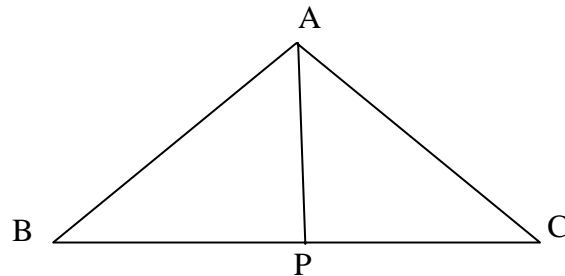
4. Give two triangles that satisfy the SSA (or ASS) property but are not congruent, hence demonstrating that SSA is not a congruency test for triangles. Under what conditions do two triangles satisfy SSA property and are congruent? (Note that in fact RHS is a “special” condition for SSA).
5. Use the congruency test for triangles to prove that any point on the perpendicular bisector of line segment AB is equidistant from A and B.
6. Consider the following figure.



- a) Identify two similar triangles in the above figure.
- b) Calculate the ratios  $\frac{AD}{DE}$  and  $\frac{BD}{CE}$ .
- c) Suppose that Area of Triangle ABD =  $20\text{ cm}^2$ , calculate the area of triangle ACE.

### Application of Sine / Cosine Rule

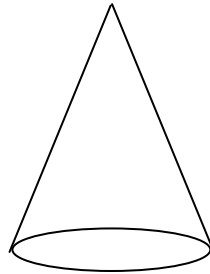
7. The diagram below shows a triangle ABC where AP is an angle bisector of  $\angle BAC$ .



Prove that  $\frac{BP}{BA} = \frac{CP}{CA}$ .

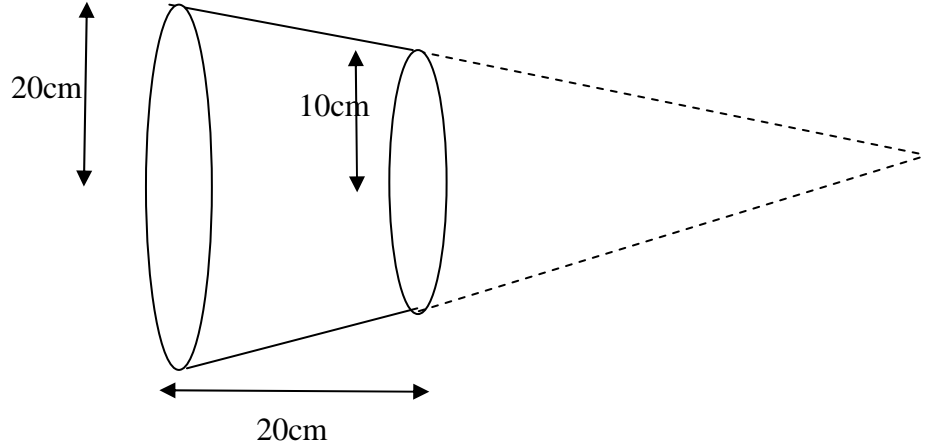
## Mensuration

8. Consider a right circular cone.



Explain why when you cut out the curved surface of the right circular cone and flatten it into two-dimension, you expect to get a sector (can be minor sector, major sector or even a full circle). (Note: some students have the misconception that when the curved surface of the cone is flattened, it forms a triangle!) Hence show that the area of the curved surface of the right cone can be expressed as  $A = \pi rl$ , where  $r$  is the base radius of the cone,  $l$  is the length of the curved surface of the cone.

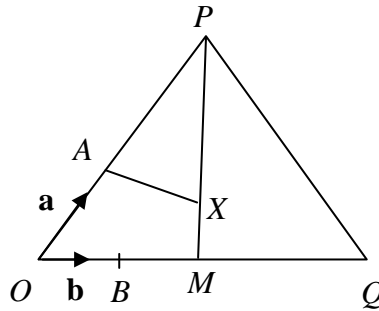
9. The diagram below shows a frustum whose two base radii are 20 cm and 10 cm, and the distance between the two circular bases are 20 cm.



Calculate the volume of the frustum.

## Vector Geometry

10. In the diagram,  $OA = \frac{1}{3}OP$ , and  $OB = \frac{1}{4}OQ$ ,  $M$  is the midpoint of  $OQ$ , and  $MX = \frac{1}{4}MP$ . Given that  $\overrightarrow{OA} = \mathbf{a}$  and  $\overrightarrow{OB} = \mathbf{b}$ , prove that  $AX$ , when produced, will not pass through  $Q$ .



## Section D: Statistics

1. Without computation, state the mean, median and mode of the following distributions:

Score	13	15	17	19	21
Frequency	20	12	19	12	20

- 2(a) Construct a set of four positive numbers (not all numbers are equal) such that the mean, the mode and the median are all equal to 13.
- 2(b) Construct a set of four positive numbers such that the mean and the mode are 12 and the range is as large as possible.

3. Refer to the following frequency distribution table.

Score	1	2	4	5
Frequency	3	5	7	$x$

- (a) Calculate the value of  $x$  if the mean of the distribution is 4.
- (b) Write down the largest possible value of  $x$  if the mode of the distribution is 4.
- (c) Write down the largest and the smallest possible value of  $x$  if the median of the distribution is 4.

**Section E: Higher Algebra (for PGDE (All Sec) only)**

1. **Indices and Surds**  
Pg 120 to 121: Questions 1 to 6
2. **Polynomial Functions (Division Algorithm, Remainder and Factor Theorem)**  
Pg 131 to 132: Questions 1 to 11
3. **Partial Fractions**  
Pg 140 – 141: Questions 1, 2, 3 and 4
4. **Binomial Theorem**  
Pg 147 – 148: Questions 1 to 5
5. **Quadratic Functions and Equations**  
Pg 163 – 165: Questions 1 to 10
6. **Exponential and Logarithmic Functions**  
Pg 172 – 173: Questions 1 to 10
7. **Coordinate Geometry**  
Refer to any Additional Mathematics Ten-Year-Series
8. **Calculus (Differentiation, Integration and their Applications)**  
Refer to any Additional Mathematics Ten-Year-Series