4N WA1 (2022-2024) Revision

Mathematical Formulae

Compound Interest

Total amount =
$$P\left(1 + \frac{r}{100}\right)^n$$

Mensuration

Curved surface area of a cone =
$$\pi rl$$

Surface area of a sphere = $4\pi r^2$

Volume of a cone =
$$\frac{1}{3}\pi r^2 h$$

Volume of a sphere
$$=\frac{4}{3}\pi r^3$$

Area of triangle
$$ABC = \frac{1}{2}ab\sin C$$

Arc length = $r\theta$, where θ is in radians

Sector area =
$$\frac{1}{2}r^2\theta$$
, where θ is in radians

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$Mean = \frac{\sum fx}{\sum f}$$

Standard deviation =
$$\sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

Extracted from 4NA WA1 2024



X, *Y* and *Z* are three points lying in a horizontal straight line. *WY* is a vertical flagpole. *WX* and *WZ* are supporting wires. WX = 18 m, WY = 13 m and angle $YWZ = 35^{\circ}$.

(a) Calculate *WZ*

Answer m [2]

(b) Benny said the angle of elevation of W from X is 43.8°. Was Benny correct? Explain your answer Answer [2]



ABC is an equilateral triangle. Angle $BDC = 90^{\circ}$, BD = 4.5 cm and BC = 8.7 cm.

Calculate (a) the length of *DC*,

(b) the area of the quadrilateral *ABDC*.



A, *B* and *C* are on level horizontal ground. BC = 78 m, angle $ACB = 110^{\circ}$ and angle $ABC = 26^{\circ}$. *C* is due north of *A*.

(a) Calculate the bearing of *B* from *C*.

3

Answer [1]

(b) Calculate the bearing of *A* from *B*.

(c) Calculate the length of *AC*.

Extracted from 4NA WA 2023

4 Harry claims that the following three numbers could be the lengths of a right-angled triangle.

55 , 73 , 48

Justify, with clear working, whether his claim is true.

5 Three points, *E*, *C* and *G* lie on a horizontal field.

 $EC = 900 \text{ m}, EG = 1082 \text{ m}, CG = 1255 \text{ m}, \angle CEG = 78^{\circ}$ and the bearing of G from E is 146°.



(a) Show that the bearing of E from G is 326° .

(**b**) Find

(i) $\angle ECG$,

Answer° [2]

(ii) the bearing of C from G.

Answer° [2]

(c) Find the area of triangle *CEG*.

[1]

(d) A building of height 80 m is erected at *C*.

Calculate the angle of elevation of the top of the building when viewed from E.

6 ABCD is a trapezium such that BC = 5 cm, CD = 6 cm and AD = 8.5 cm.



(a) Calculate the angle *x* shown on the diagram.

Answer $x = \dots^{\circ}$ [2]

(b) Calculate the perimeter of trapezium *ABCD*.

7 The stem-and-leaf diagram below shows the first weighted assessment scores of a Secondary 2 class.There are 30 students in this class and the maximum mark of the paper is 40.

					Ke	у						
4	0											
3	0	0	1	2	4	4	7	8				
2	0	1	2	2	2	3	5	5	7	8	8	9
1	2	4	5	5	6	6	7	8	8			

1 | 2 means 12 marks

(a) Find the range and the mode of the scores.

Answer Range = marks

Mode = marks [2]

(b) A student can take Additional Mathematics in Secondary 3 if his or her score is 75% and above.
An Additional Mathematics class can only be created if there are at least 10 students enrolled into it.

Based on the information above, can an Additional Mathematics class be created? Show your working clearly.

8 (a) The times taken by 240 people to cast their votes, at both polling station X and Y, in a country's General Election is shown in the cumulative frequency curve below.



Use the graph to find, for polling station *X*,

(i) the median time,

Answer minutes [1]

(ii) the interquartile range.

(iii) People who took more than 30 minutes to cast their votes were unhappy with the process.

Find the percentage of people at polling station *X* who were unhappy with the process.

(b) The box-and-whisker plot for the time taken for people to cast their votes at Polling Station *Y* is shown below.



Find the value of *a* and of *b*.

(c) Abby claimed that the times taken by people to cast their votes were more consistent in polling station *X* than in polling station *Y*.

Is the statement true? Give a reason for your answer.

Extracted from 4NA WA 2022

9 *A* and *B* are two points on level ground. *CD* is a building of height 46.7 m. It is given that the angle of elevation of the top of the building from *A* is 23° and AB = 40 m.



Find the angle of depression of *B* from the top of the building.

Answer[4]

10 *P*, *Q* and *R* are three points on level ground. *P* is 12 km due north of *Q*. *PR* = 7.5 km and $\angle QPR = 65^{\circ}$.



Find

(a) the length of QR,

(**b**) the bearing of Q from R.

Answer km [3]

11 *A* and *B* are two points on level ground. *CD* is a building of height 46.7 m. It is given that the angle of elevation of the top of the building from *A* is 23° and AB = 40 m.



Find the angle of depression of *B* from the top of the building.

Answer[4]

12 The box-and-whiskers diagram below shows the results for a Mathematics test for a group of 150 students.



(a) Find (i) the median mark,

Answer[1]

(ii) the interquartile range.

Answer[2]

- (b) The same group of students also took an English test. The median mark and range for the English test were both 52.
 - (i) The top student for the English test scored 98 marks, find the lowest score obtained for the English test.

 (ii) Steven commented that the students did better in English compared to Mathematics.

Explain whether you agree with Steven.

(c) The interquartile range of the English test was 25. Explain the significance of the difference in interquartile range between the English test and the Mathematics test.

Answer	•••••	 •••••	 •••••	• • • • • • • • •	 	••••		••••
		 	 		 		[[1]

13 The cumulative frequency graph below shows the distribution of the average time spent on computer games per week by 120 teenagers.



Cumulative Frequency

(b) Find the number of students who spend between 10 and 50 hours a week on computer games.

A teenager is considered to be a gaming addict if he spends more than 60 hours (c) a week on computer games. Calculate the percentage of teenagers who are gaming addicts. Give your answer correct to 3 significant figures.

14 The stem-and-leaf diagram below shows the distribution of the weight of puppies.

Stem	Leaf
0	4 7
1	2 2 3 5 7 9
2	1233 a 49
3	4 b 5 5 c

Key: 1 | 2 represents 1.2 kg

It is given that the mean and mode of the weight of the puppies are 2.2 and **(a)** 2.3 respectively.

Write down the values of *a*, *b* and *c*.

Answer	<i>a</i> =[1]
Answer	<i>b</i> =
Answer	<i>c</i> =[2]

(b) Find the median weight.

The weight of the puppies are represented using a pie chart.

(c) Calculate the angle representing the weight of puppies between 1kg and 2kg.