

MANZANILLA SECONDARY SCHOOL

5 SCIENCE END OF TERM 1 TEST MATHEMATICS MS. RAGBIR

STUDENT'S NAME: _____

LIST OF FORMULAE

Volume of a prism

$V = Ah$ where A is the area of a cross-section and h is the perpendicular length.

Volume of a cylinder

$V = \pi r^2 h$ where r is the radius of the base and h is the perpendicular height.

Volume of a right pyramid

$V = \frac{1}{3} Ah$ where A is the area of the base and h is the perpendicular height.

Circumference

$C = 2\pi r$ where r is the radius of the circle.

Area of a circle

$A = \pi r^2$ where r is the radius of the circle.

Area of Trapezium

$A = \frac{1}{2}(a+b)h$ where a and b are the lengths of the parallel sides and h is the perpendicular distance between the parallel sides.

Roots of quadratic equations

If $ax^2 + bx + c = 0$,

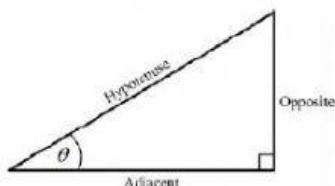
$$\text{then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Trigonometric ratios

$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$$



Area of triangle

Area of $\Delta = \frac{1}{2}bh$ where b is the length of the base and h is the perpendicular height

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

$$\text{Area of } \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$$

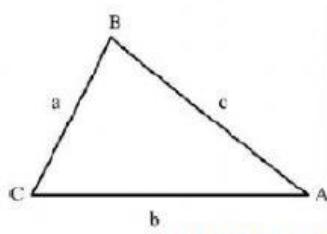
$$\text{where } s = \frac{a+b+c}{2}$$

Sine rule

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule

$$a^2 = b^2 + c^2 - 2bc \cos A$$



SECTION B

This section has three questions worth 30 marks. You can use a calculator. You have 75 minutes to complete this section.

Answer ALL questions.

All working must be clearly shown.

1. (a) Simplify completely
(i) $3p^2 \times 4p^5$

2 marks

(ii)
$$\frac{3x}{4y^3} \div \frac{21x^2}{20y^2}$$

(2 marks)

(b) Solve the equation

$$\frac{3}{7x-1} + \frac{1}{x} = 0.$$

x =

(3 marks)

(c) When a number, x , is multiplied by 2, the result is squared to give a new number, y .

(i) Express y in terms of x .

Y =

..... (1 mark)

(ii) Determine the two values of x that satisfy the equation $y = x$ AND the equation derived in (c) (i).

X =

y =

X =

y =

..... (2 marks)

Total marks = 10

2. (a) Using a ruler, a pencil and a pair of compasses only, construct the triangle NLM , in which $LM = 12 \text{ cm}$, $\angle MLN = 30^\circ$ and $\angle LMN = 90^\circ$.

(Credit will be given for clearly drawn construction lines.)

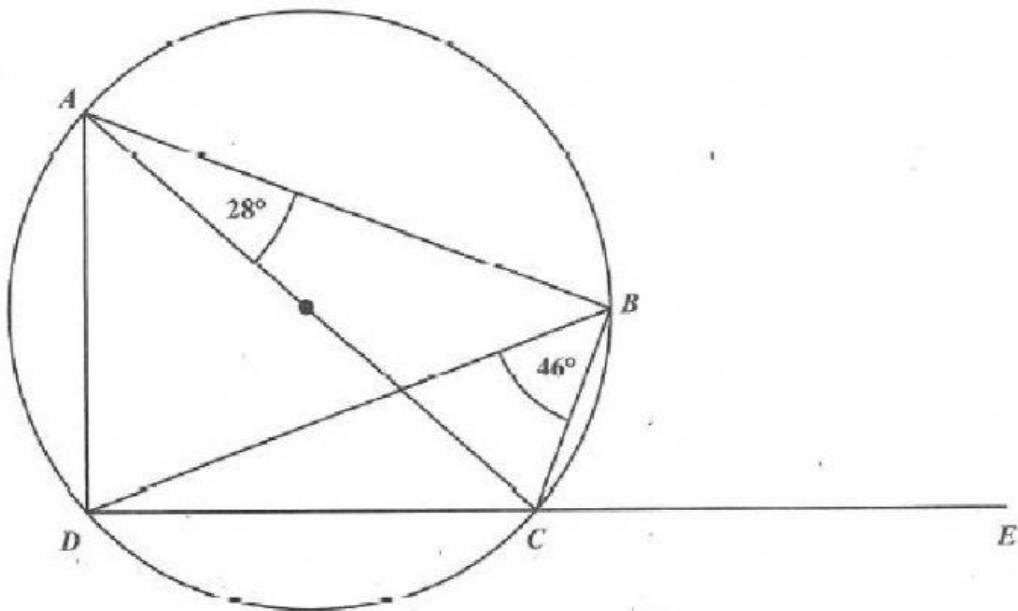
Length of LN = **cm**

Length of MN = **cm**

(4 marks)

B.(a)

The diagram below shows a circle where AC is a diameter. B and D are two other points on the circle and DCE is a straight line. Angle $CAB = 28^\circ$ and $\angle DBC = 46^\circ$.



Calculate the value of each of the following angles. Show detailed working where necessary and give a reason to support your answers.

(i) $\angle DBA$
= **degrees**

Reason

.....
.....
.....
(2 marks)

(ii) $\angle DAC$ = **degrees**

D.

Reason
.....
.....

(2 marks)

(iii) $\angle BCE$ = **degrees**

Reason
.....
.....

(2 marks)

TOTAL MARKS = 10

3.

(a) The functions f and g are defined by

$$f(x) = \frac{9}{2x+1} \quad \text{and} \quad g(x) = x - 3.$$

(i) State a value of x that CANNOT be in the domain of f .

X cannot be _____

(1 mark)

(ii) Find, in its simplest form, expressions for

a) $fg(x)$

(2 marks)

b) $f^{-1}(x)$: $\frac{\text{_____}}{\text{_____}}$

3 marks

c. The equation of a straight line is given as

$$\frac{x}{3} + \frac{y}{7} = 1.$$

This line crosses the y -axis at Q .

(i) Determine the coordinates of Q .

$$Q = (\quad , \quad)$$

(ii) What is the gradient of this line?

2 marks

$$m = \underline{\hspace{2cm}}$$

(2 marks)

TOTAL MARKS = 10