



## MATHS

### BOOKS - OSWAL PUBLICATION

### NTSE 2019 -20

#### Real Numbers Stage 1

1.

$$\frac{1}{1 + x^{b-a} + x^{c-a}} + \frac{1}{1 + x^{a-b} + x^{c-b}} + \frac{1}{1 + x^{b-c} + x^{a-c}} = ?$$

A.  $-1$

B.  $1$

C.  $0$

D. 2

**Answer:**



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2. The capacity of two pots are 240 litres and 112 litres respectively . Find the capacity of a container which can exactly measure the contents of the two pots .

A.  $9000cm^3$

B.  $12000cm^3$

C.  $16000cm^3$

D.  $8000cm^3$

**Answer: C**

## Real Numbers Stage 2

1. If  $m = n^2 - n$ , where  $n$  is an integer, then  $m^2 - 2m$  is divisible by

A. 20

B. 24

C. 30

D. 16

**Answer:**

1. If  $t^2 - 3t + 2$  is a factor of  $t^4 - mt^2 + n$ , then the value of  $m$  and  $n$  are :

- A.  $-5, 4$
- B.  $-5, -5$
- C.  $5, 4$
- D.  $5, -4$

**Answer:**



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2. If  $p, q$  and  $r$  are the roots of the equation  $x^3 + 5x^2 - 16x + 48 = 0$  then value of the expression

$p(qr + q + r) + qr$  is :

A. 43

B.  $-32$

C.  $-64$

D. 32

**Answer:**



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3. If  $t + \frac{1}{t} = 5$ , then  $\frac{2t}{3t^2 - 5t + 3}$  is equal to .....

A. 5

B.  $\frac{1}{5}$

C. 3

D.  $\frac{1}{3}$

**Answer:**



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## Polynomials Stage 2

1. The value of  $\sqrt{97 \times 98 \times 99 \times 100 + 1}$  is equal to

A. 9901

B. 9891

C. 9801

D. 9701

**Answer: D**



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2. Let  $P(x)$  be a polynomial such that  $p(x)-p'(x)=x^n$ , where  $n$  is a positive integer. Then  $P(0)$  equals-

A. 0

B.  $\frac{1}{5}$

C.  $-\frac{2}{5}$

D.  $\frac{3}{5}$

**Answer:**



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Pair Of Linear Equations In Two Variables Stage 1

1. If  $a^{x-1} = bc$ ,  $b^{y-1} = ca$ ,  $c^{z-1} = ab$ , and  $\frac{xy + yz + zx}{xyz} = k$ , then find  $K$

A.  $xyz$

B. 0

C. 27

D.  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$

**Answer:**



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## Pair Of Linear Equations In Two Variables Stage 2

1. In village madhubani 8 women and 12 girls can paint a large mural in 10 hours . 6 women and 8 girl can paint it in 14 hours



.The numbers of hours taken by 7 women and 14 girl to paint the mural is :

A. 10

B. 15

C. 20

D. 35

**Answer:**



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## Quadratic Equations Stage 2

1. If  $\alpha$  and  $\beta$  are the roots of the equation  $3x^2 - 5x + 3 = 0$ , then the quadratic equation whose roots are  $\alpha^2\beta$  and  $\alpha\beta^2$  is :

A.  $3x^2 - 5x + 3 = 0$

B.  $3x^2 - 8x + 5 = 0$

C.  $3x^2 - 8x + 3 = 0$

D.  $3x^2 - 5x - 3 = 0$

**Answer:**



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2. If  $y = x^3$  and  $x$  increases at the rate of 3 units per sec; then the rate at which the slope increases when  $x=3$  is.

A.  $y^2 - 18y + 1 = 0$

B.  $y^2 + 18y + 1 = 0$

C.  $y^2 - 18y - 1 = 0$

$$D. y^2 + 18y - 1 = 0$$

**Answer:**



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## Arithmetic Progressions Stage 1

1. If  $x_1, x_2, x_3, \dots$  are in A.P., then the value of

$$\frac{1}{x_1x_2} + \frac{1}{x_2x_3} + \frac{1}{x_3x_4} + \dots + \frac{1}{x_{n-1}x_n} \text{ is :}$$

A.  $\frac{n-1}{x_1x_n}$

B.  $\frac{n-1}{x_2x_{n-1}}$

C.  $\frac{n}{x_1x_n}$

D.  $\frac{n+1}{x_1x_n}$

**Answer:**



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2. If the sum of 'n' terms of an arithmetic progression is

$S_n = 3n + 2n^2$  then its common difference is :

A. 9

B. 6

C. 4

D. 3

**Answer:**



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1. The centroid of a triangle is  $(2,4)$  and circumcentre is  $(1,7)$ , then find the orthocentre .

A.  $(3,1)$

B.  $(4, - 2)$

C.  $( - 2, 4)$

D.  $( - 8, 4)$

**Answer:**



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2. If  $x < 1, y < - 1$ , then  $(x - 1, y - 3)$  lies in :

A. III quadrant

B. IV quadrant

C. II quadrant

D. I quadrant

**Answer:**



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**3.** Angles made by the line with the positive direction of X-axis are given. Find the slope of these lines

$60^\circ$

A. Statement (i) and (ii) correct

B. Statement (iii) and (iv) correct

C. Only statement (iii) is wrong

D. All statement are wrong

**Answer:**

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## Coordinate Geometry Stage 2

1. A circle passes through the vertices of a triangle ABC. If the vertices are  $A(-2, 5)$ ,  $B(-2, -3)$ ,  $C(2, -3)$  then the centre of the circle is :

A.  $(0, 0)$

B.  $(0, 1)$

C.  $(-2, 1)$

D.  $(0, -3)$

**Answer: B**



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## Triangles Stage 1

1. D, E and F are respectively the mid -points of the sides BC, CA and AB of a  $\triangle ABC$  .Show that (i) BDEF is a parallelogram

A.  $120^\circ$

B.  $110^\circ$

C.  $135^\circ$

D.  $130^\circ$

**Answer:**

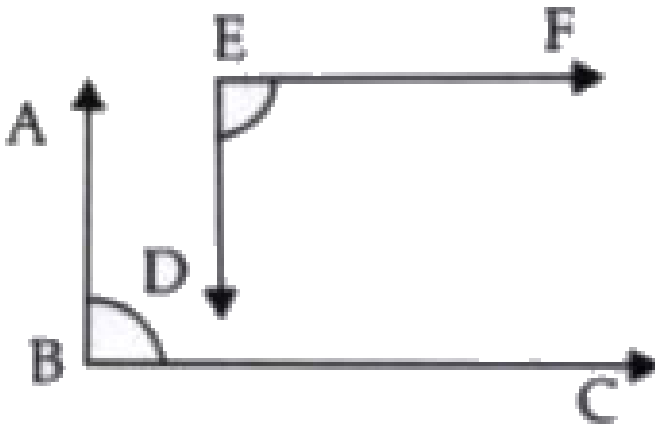


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2. In the given figure ,  $AB \parallel ED$  and  $BC \parallel EF$  , then the value of

$\angle ABC + \angle DEF$  is :



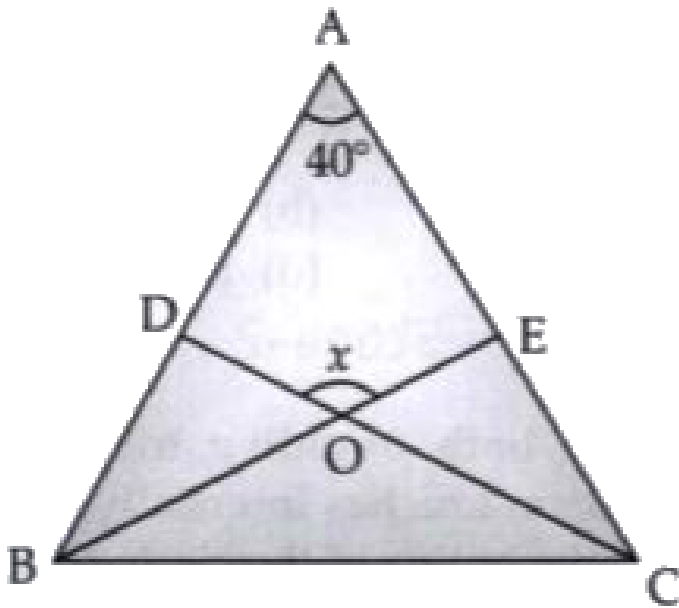
- A.  $90^\circ$
- B.  $180^\circ$
- C.  $120^\circ$
- D.  $360^\circ$

Answer:



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3. In the given figure ,  $AB = AC$  ,  $\angle BAC = 40^\circ$  ,  $BE$  and  $CD$  are angle bisectors of  $\angle B$  and  $\angle C$  respectively . If  $\angle DOE = x$  , the value of  $x$  is :



A.  $140^\circ$

B.  $70^\circ$

C.  $110^\circ$

D.  $40^\circ$

**Answer: C**



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4. ABC is a right angled triangle , right angled at  $\angle B$  . If side AB is divided into three equal parts by points D and E such that D is nearest to A , then  $\frac{AC^2 - EC^2}{DC^2 - BC^2}$  is equal to :

A. 3

B.  $2\frac{1}{2}$

C.  $2\frac{1}{4}$

D. 2

**Answer: D**



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## Triangles Stage 2

1. Let D be the middle point of the side BC of a triangle ABC. If the triangle ADC is equilateral, then  $a^2 : b^2 : c^2$  is equal to

A.  $14 \times 3^{\frac{1}{2}}$

B.  $42 \times 3^{\frac{1}{2}}$

C.  $14 \times 3^{\frac{3}{4}}$

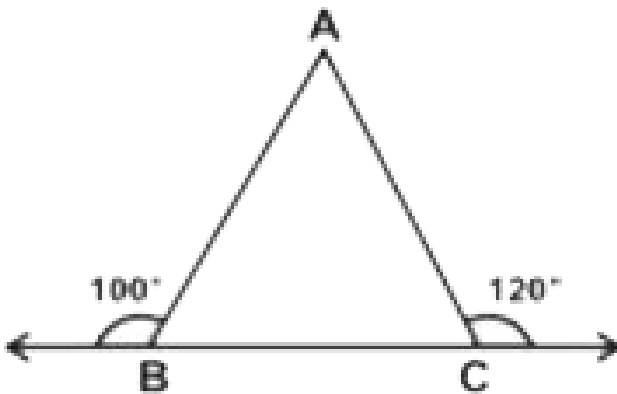
D.  $42 \times 3^{\frac{1}{2}}$

Answer:

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## Circles Stage 1

1. In the figure what is  $m\angle A =$



A. 37

B. 41

C. 53

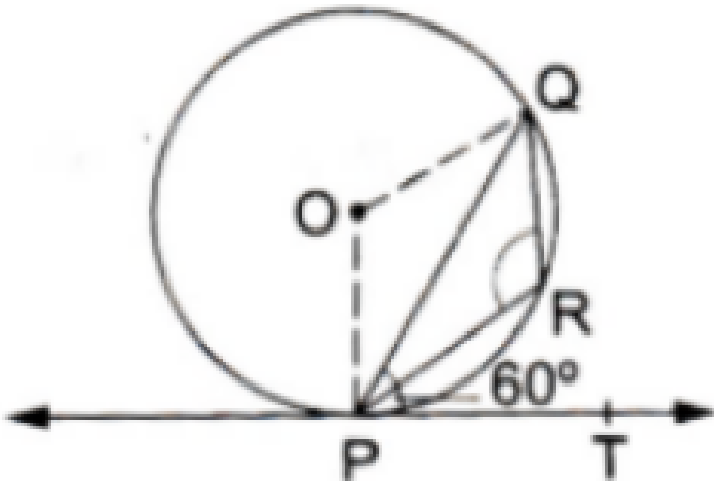
D. 47

**Answer:**



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2. In the adjoining figure,  $PQ$  is a chord of a circle and  $PT$  is the tangent at  $P$  such that  $\angle QPT = 60^\circ$ . Find  $\angle PRQ$ .



- A.  $105^\circ$
- B.  $115^\circ$
- C.  $120^\circ$
- D.  $130^\circ$

**Answer:**



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1. Two circles, both of radii  $a$ , touch each other and each of them touches internally a circle of radius  $2a$ , then the radius of the circle which touches all the three circles is :

A.  $\frac{1}{2}a$

B.  $\frac{2}{3}a$

C.  $\frac{3}{4}a$

D.  $a$

**Answer: B**



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1. If  $a \cos \theta - b \sin \theta = c$ , then  $a \sin \theta + b \cos \theta$  is equal to

A.  $\pm \sqrt{a^2 + b^2 + c^2}$

B.  $\pm \sqrt{a^2 + b^2 - c^2}$

C.  $\pm \sqrt{a^2 - b^2 + c^2}$

D.  $\pm \sqrt{a^2 - b^2 - c^2}$

**Answer:**



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2. The value of  $\frac{\sin \pi}{14} + \frac{\sin(3\pi)}{14} + \frac{\sin(5\pi)}{14} + \frac{\sin(7\pi)}{14} + \frac{\sin(9\pi)}{14} + \frac{\sin(11\pi)}{14} + \frac{\sin(13\pi)}{14}$  is equal to \_\_\_\_\_

A.  $\frac{1}{16}$

B.  $\frac{1}{64}$

C.  $\frac{1}{128}$

D. None of these

**Answer:**



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## Introduction To Trigonometry Stage 2

1. If  $\tan^2 \theta = (1 - e^2)$ , then  $\sec \theta + \tan^3 \theta \operatorname{cosec} \theta$  is equal to

A.  $(1 - e^2)^{\frac{1}{2}}$

B.  $(2 - e^2)^{\frac{1}{2}}$

C.  $(2 - e^2)^{\frac{3}{2}}$

D.  $(1 - e^2)^{\frac{3}{2}}$

**Answer:**

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## Heights And Distances Stage 1

1. The shadow of a tower , when the angle of elevation of the sun is  $30^\circ$  is found to be 10 metre longer than when it was  $60^\circ$ . The height of the tower will be :

A.  $5\sqrt{3}m$

B.  $5(\sqrt{3} - 1)m$

C.  $5(\sqrt{3} + 1)m$

D.  $3\sqrt{5}m$

**Answer:**



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## Areas Related To Circles Stage 2

1. A circle is inscribed in a right angled triangle of perimeter  $7\pi$ . Then the ratio of numerical values of circumference of the circle to the area of the right angled triangle is :

A. 4 : 7

B. 3 : 7

C. 2 : 7

D. 1 : 7

**Answer: A**



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## Surface Areas And Volumes Stage 2

1. The surface area of a solid sphere is  $5544\text{cm}^2$ . It is cut into two hemispheres. Calculate the radius of the sphere and the total surface area of each hemisphere.

A.  $36\pi$

B.  $108\pi$

C.  $135\pi$

D.  $144\pi$

**Answer:**



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2. A solid metallic cylinder of height 10 cm and diameter 14 cm is melted to make two cones in the proportion of their volumes as 3:4 , keeping the height 10 cm , what would be the percentage increase in the flat surface area ?

A. 0.09 %

B. 16 %

C. 50 %

D. 200 %

**Answer: C**



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1. The mean of 25 observations is 36. If the mean of the first 13 observations is 32 and that of the last 13 observations is 39 then the 13<sup>th</sup> observation is :

A. 32

B. 30

C. 28

D. 23

**Answer:**



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1. Observe the following data :

Class	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	$f_1$	32	$f_2$	19	120

If the above data has mean = 50 , then missing frequencies

$f_1$  and  $f_2$  are

A. 24 and 28

B. 28 and 24

C. 28 and 30

D. 30 and 28

**Answer: B**



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1. In a hostel 60 % of students read Hindi newspapers , 40 % read English and 20 % both . A student is selected at random . Find the probability that she reads neither Hindi nor English newspaper .

A.  $\frac{1}{5}$

B. 0

C.  $\frac{1}{3}$

D.  $\frac{1}{2}$

**Answer: A**



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2. Three squares of a class board are selected at random . The probability of getting two squares of one colour and other of a different colour is :

A.  $\frac{16}{21}$

B.  $\frac{8}{21}$

C.  $\frac{3}{32}$

D.  $\frac{3}{8}$

**Answer: A**



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**Probability Stage 2**

1. If two dice are thrown together . Then , the probability that the sum of the numbers appearing on them is a prime number, is

A.  $\frac{2}{9}$

B.  $\frac{4}{9}$

C.  $\frac{5}{12}$

D.  $\frac{17}{36}$

**Answer:**



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