SAMPLE QUESTION PAPER

Summative Assessment – II

Class – X (2015–16)

Mathematics - Marking Scheme

Section A

Ans 1. K = 3 [1]

Ans 2. $\sqrt{200}$ [1]

Ans 3. 47/50 [1]

Ans 4. a= - 9 [1]

Section B

Ans 5.

2 is the root of $x^2+kx+12=0$

$\Rightarrow (2)^2 + 2k+12=0$

$\Rightarrow 2k+16=0$

k=-8 [1/2]

Put k=-8 in $x^2 +kx+q=0$

$\Rightarrow x^2 -8x+q=0$ [1/2]

For equal roots

$(-8)^2 – 4\ (1)q=0$ [1/2]

64 -4q =0

4q = 64

q = 16 [1/2]

Ans 6.

Two digit numbers which are divisible by 7 are

14,21,28,…….98. [1/2]

It forms an A.P.

a=14, d=7, a_n=98 [1/2]

a_n=a+(n-1) d

98=14+(n-1)7 [1/2]

98-14=7n-7

84+7=7n

7n=91

n=13 [1/2]

Ans 7

Let P(x,y) is equidistant from A(-5,3) and B(7,2)

AP=BP [1/2]

$\Rightarrow\sqrt{((x+5)^2+(y-3)^2)} = \sqrt{((x-7)^2+(y-2)^2)}$

$\Rightarrow x^2+10x+25+y^2-6y+9 = x^2-14x+49+y^2-4y+4$ [1/2]

10x-6y+34 = -14x-4y+53

10x+14x-6y+4y = 53-34

24x-2y = 19

24x – 2y – 19 = 0 is the required relation [1]

Ans 8

Perimeter of the shaded region

= AD+ BC + lengths of semi circles APB&CPD [1]

= 21+21+2(2x—x —) [1/2]

= 42+2(66)

= 42+ 132

=174 cm [1/2]

Ans 9

Let the water level raised in cylindrical vessel be h cm

Volume of Sphere = Volume of water displaced in cylinder [1/2]

$-\pi (3)^3 = \pi (6)^2 h$ [1]

–x27 = 36 h

36 = 36h

h = 1cm [1/2]

Ans 10

Volume of Coin = $\pi r^2 h$

= $\frac{22}{7}$x$(0.75)^2$ x0.2 cm^3 [1/2]

Volume of Cylinder = $\frac{22}{7}$x$(2.25)^2$ x10 cm^3 [1/2]

No. of Coins = Volume of Cylinder / Volume of Coin [1/2]

=($\frac{22}{7}$x$(2.25)^2$ x10) / ($\frac{22}{7}$x$(0.75)^2$ x0.2)

=450 [1/2]

Section C

Ans 11

$\frac{}{} = - + - + -$

$\Rightarrow \frac{}{} - = - + -$ [1/2]

$\Rightarrow \frac{}{} = \frac{}{}$ [1/2]

$\Rightarrow \frac{}{} = \frac{}{}$

$\Rightarrow \frac{}{} = \frac{}{}$ [1/2]

$\Rightarrow x(a + b + x) = - ab$

$\Rightarrow x^2 + (a+b)x - ab = 0$

$\Rightarrow (x+a)(x+b) = 0$ [1]

$\Rightarrow x = -a$ or $x = -b$ [1/2]

Ans 12

$= \frac{}{}$

$a_n = S_n - S_{n-1}$ [1]

$\Rightarrow a_{25} = S_{25} - S_{24}$

$= \frac{}{} - \frac{}{}$ [1]

$= \frac{1}{}\{3 (25^2 - 24^2) + 13 (25-24)\}$

$= (3x49 + 13) = 80$ [1]

Ans 13

Let the first term of A.P be a and common difference be d.

$a_9=7a_2$

$\Rightarrow a+8d = 7\ (a+d)$ …….. (1) [1/2]

$a_{12} = 5a_3+2$

$\Rightarrow a + 11d = 5\ (a + 2d) + 2$ …….. (2) [1]

From (1), $a + 8d = 7a + 7d$

$-6a + d = 0$ …….. (3)

From (2), $a + 11d = 5a + 10d + 2$

$-4a + d = 2$ …….. (4)

Subtracting (4) from (3)

$-2a = -2$

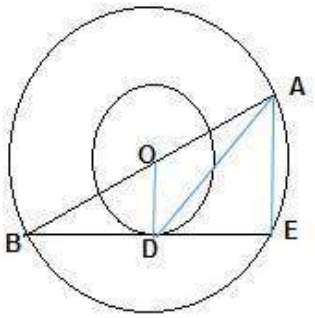
$\Rightarrow a = 1$ [1]

From (3),

$-6 + d = 0$

$d = 6$ [1/2]

Ans 14



Join OD and AE [1/2]

$\angle ODB = 90^o$ ……. (radius is perpendicular to tangent at

point of contact)

$\angle AEB = 90^o$ ……. (angle in a semicircle)

OD || AE …… (Corresponding Angles) [1/2]

AE = 2 x OD

= 2 x 8 = 16 cm [1/2]

In right Δ ODB, $BD^2 = 13^2 - 8^2$ [1/2]

= 169-64 = 105

BD = $\sqrt{105}$ cm

DE = $\sqrt{105}$ cm [1/2]

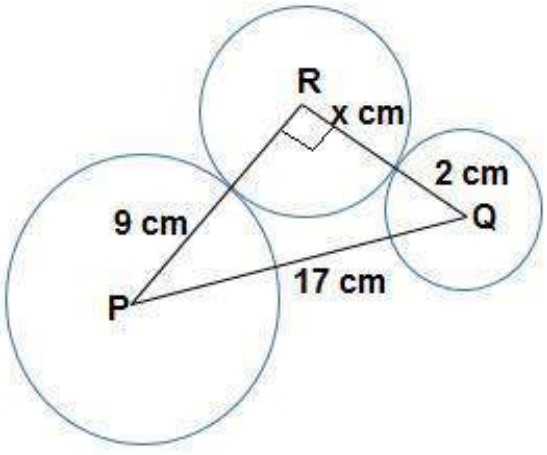
In right Δ AED, $AD^2 = AE^2 + DE^2$

$=16^2 + (\sqrt{105})^2$

=256+105 = 361

AD = 19 cm [1/2]

Ans15



[1/2]

In right ΔPQR, by Pythagoras theorem

$PQ^2 = PR^2 + PQ^2$

$\Rightarrow$ $17^2 = (x+9)^2 + (x+2)^2$ [1]

$\Rightarrow x^2 + 11x - 102 = 0$ [1/2]

$\Rightarrow x^2 + 17x - 6x - 102 = 0$

$\Rightarrow x(x+17) - 6(x+17) = 0$

$\Rightarrow$ $(x-6)(x+17) = 0$

$\Rightarrow$ $x = 6$ or $x = -17$ [1/2]

$\Rightarrow$ $x = 6$ cm (x can't be negative) [1/2]

Ans 16

For correct construction [3]

Ans 17

Total number of cards = 52

Number of non face cards = 52 – 12

= 40

P(non-face cards) = $\frac{40}{52} = \frac{10}{13}$ [1]

Number of black kings = 2

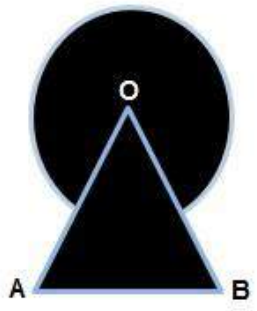
Number of red queens = 2

P(a black King or a red queen) = $\frac{4}{52}$ [1]

Number of spade cards = 13

P (Spade cards) = $\frac{13}{52}$ [1]

Ans 18



$\angle AOB = 60^O$ [1/2]

Area of shaded region

= Area of ΔAOB + Area of major sector of circle [1]

$= \frac{\sqrt{3}}{4} (12)^2 + \frac{300^0}{360^0} \times \frac{22}{7} \times (6)^2$ cm^2 [1]

$= 36\sqrt{3} + \frac{660}{7}$ cm^2 [1/2]

Ans 19

Length of water that flows out in 30 minutes

= (0.7 X 100 X 60 X 30) cm

= 126000 cm [1]

Volume of water that flows out in 30 minutes

$= \pi (1)^2 \times 126000$ cm^3

$= 126000 \pi$ cm^3 [1/2]

Let the depth of water in the tank be x cm

Volume of water in tank

$= \pi (40)^2 X \times$ cm^3 [1/2]

According to the question

$\pi (40)^2 X x = 126000\pi$ [1/2]

$\Rightarrow$ x = 78.75 cm [1/2]

Ans 20

Let R and r be the radii of the circular ends of the frustum. (R> r)

$2\pi R = 207.24$

$R = 207.24/ (2 \times 3.14)$

$R = 33$ cm [1]

$2\pi r = 169.56$ cm

$r = 169.56 / (2 \times 3.14)$

$r = 27$ cm [1/2]

$l^2 = h^2 + (R-r)^2$

$= 8^2 + (33-27)^2$ [1/2]

$l = 10$ cm [1/2]

Whole surface area of the frustum

$= \pi (R^2 + r^2 + (R+r)l)$

$= 3.14 ((33)^2 + (27)^2 + (33+27)10)$ [1/2]

$= 3.14 (1089 +729 + 600)$

$= 3.14 \times 2418$ cm^2

= 7592.52 cm^2[1]

Section D

Ans 21

Let the total number of students be x

$\frac{3}{8}x = 16 + \sqrt{x}$ [1]

$\Rightarrow \frac{3}{8}x - 16 = \sqrt{x}$

$\Rightarrow 3x - 128 = 8\sqrt{x}$

$\Rightarrow$ $3x - 8\sqrt{x} - 128 = 0$ [1/2]

Let $\sqrt{x} = y$

$3y^2 - 8y - 128 = 0$ [1/2]

$\Rightarrow$ $3y^2 - 24y + 16y - 128 = 0$

$\Rightarrow 3y(y-8) + 16(y-8) = 0$

$\Rightarrow (y-8)(3y+16) = 0$

$y = 8$ or $y = -16/3$

$y = 8 \Rightarrow x = 64$

$y = -16/3 \Rightarrow x = 256/9$

number of students = 64 [1]

Values inculcated [1]

Ans 22

$a = 8$, $d = 1/3$ years, $S_n = 168$ [1/2]

$S_n = \frac{n}{2}[2a + (n-1)d]$

$\Rightarrow 168 = \frac{n}{2}[2(8) + (n-1)\frac{1}{3}]$ [1/2]

$n^2 + 47n - 1008 = 0$ [1]

$\Rightarrow n^2 + 63n - 16n - 1008 = 0$

$\Rightarrow (n-16)(n+63) = 0$

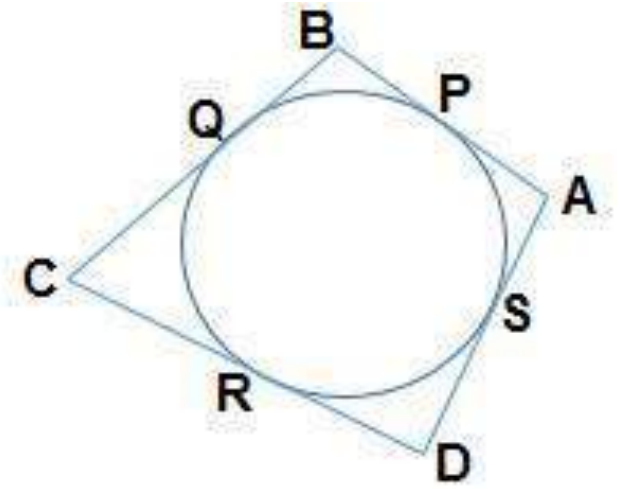
$\Rightarrow n = 16$ or $n = -63$

$n = 16$ (n cannot be negative) [1]

Age of the eldest participant = $a + 15d$ = 13 years [1]

Ans 23

Correct Proof of the theorem [2]



In the given figure,

Using the above theorem

AP = AS ……..(1)

BP = BQ ……(2)

DR = DS ……(3)

CR = CQ……..(4) [1]

Adding (1), (2),(3) and (4), we get

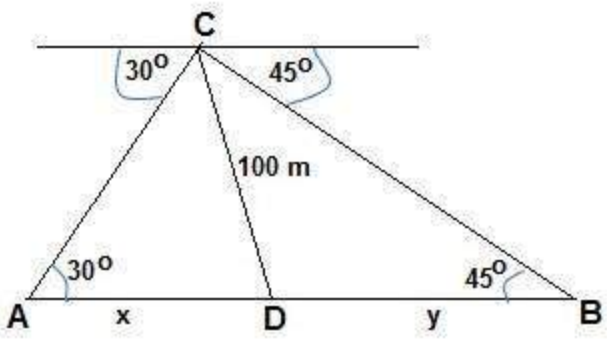
(AB+BP) + (DR+CR) = (AS+DS) + (BQ+CQ)

$\Rightarrow$ AB +CD = AD + BC [1]

Ans 24

For correct constructions [4]

Ans 25



Correct diagram [1]

In right ∆ADC

tan 30° = $\frac{CD}{AD}$ [1/2]

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{100}{x}$

$\Rightarrow$ x = 100 √3 ..... (1) [1/2]

In right ∆BDC

tan 45° = $\frac{CD}{DB}$ [1/2]

$\Rightarrow$ 1 = $\frac{100}{y}$ [1/2]

$\Rightarrow$ y = 100 m

Distance between two cars

= AB = AD + DB [1/2]

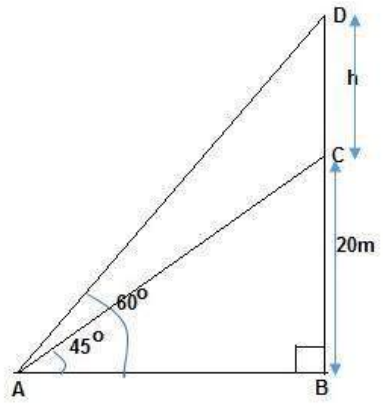
= (100 √3 + 100)m

= (100 X 1.73 + 100)m

= (173 + 100) m

= 273 m [1/2]

Ans 26



Let BC be building of height 20m and CD be the tower of height h m.
Let A be point on the ground at a distance of x m from the foot of the building. [1]
In right ∆ ABC,

$\tan 45^\circ = \frac{BC}{AB}$

$\Rightarrow 1 = \frac{20}{X}$

$\Rightarrow$ x = 20m ……(1) [1]

In right ∆ ABD,

$\tan 60^\circ = \frac{BD}{AB}$

$\Rightarrow \sqrt{3} = \frac{h+20}{X}$

$\Rightarrow \sqrt{3} = \frac{h+20}{20}$ [1]

$\Rightarrow$ h = 20 √3 – 20

= 20 (√3 – 1)

= 20 x 0.732

= 14.64 m

Height of tower = 14.64 m [1]

Ans 27

Total number of cards = 48

Probability of an event = $\frac{Total\ number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes}$ [1]

Number of cards divisible by 7 = 7

P(cards divisible by 7) = $\frac{7}{48}$ [1]

Number of cards having a perfect square = 6

P(cards having a perfect square)= $\frac{6}{48}$ = $\frac{1}{8}$ [1]

Number of multiples of 6 from 3 to 50 = 8

P (multiple of 6 from 3 to 50) = $\frac{8}{48}$ = $\frac{1}{6}$ [1]

Ans 28

By Section formula

9a-2 = $\frac{3(8a)+1(3a+1)}{3+1}$ ……..(1) [1]

-b = $\frac{3(5)+1(-3)}{3+1}$ ……(2) [1]

From (2)

-b = $\frac{15-3}{4}$ = 3

b = -3 [1]

From (1)

9a – 2 = $\frac{24\ a+3a+1}{4}$

4 (9a – 2) = 27a + 1

36a – 8 = 27a + 1

9a = 9

a = 1 [1]

Ans 29

Let P(x_1, y_1) and Q(x_2, y_2) are two points which divide AB in three equal parts.

By Section formula

P(x_1, y_1) = ($\frac{1X\ (-4)+2X\ (2))}{1+2}$, $\frac{1X\ (-6)+2X\ (-3))}{1+2}$) [1]

= ($\frac{-4\ +4}{3}$, $\frac{-6\ +(-6)}{3}$)

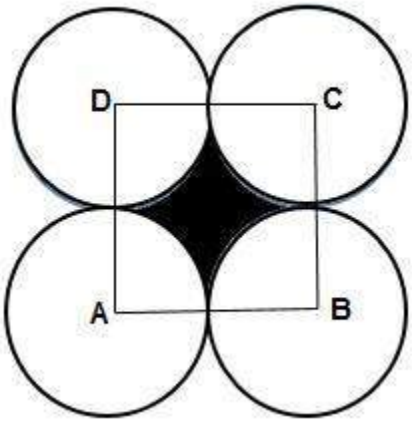
= (0, -4) [1]

$Q(x_2, y_2) = \left(\frac{2X(-4)+1X(2))}{2+1} , \frac{2X(-6)+1X(-3))}{2+1} \right)$ [1]

$= \left(\frac{-8+2}{3} , \frac{-12+(-3)}{3}\right)$

= (-2, -5) [1]

Ans 30



Let r cm be the radius of each circle.

Area of square – Area of 4 sectors = $\frac{24}{7}$ cm^2 [1/2]

$\Rightarrow$ $(2r)^2 - 4 \left(\frac{90^0}{360^0} \text{ X } \pi r^2 \right) = \frac{24}{7}$ [1]

$\Rightarrow$ $4r^2 - \frac{22}{7}r^2 = \frac{24}{7}$ [1/2]

$\Rightarrow \frac{28r^2 - 22r^2}{7} = \frac{24}{7}$

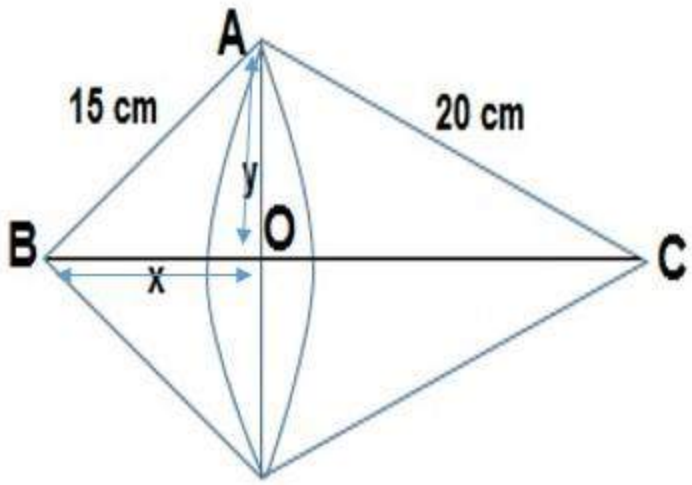
$\Rightarrow$ $6r^2 = 24$

$\Rightarrow$ $r^2 = 4$ [1]

$\Rightarrow$ $r = \pm 2$

$\Rightarrow$ radius of each circle is 2 cm (r cannot be negative) [1]

Ans 31



In rightΔ BAC, by Pythagoras theorem

$BC^2 = AB^2 + AC^2$

$= 15^2 + 20^2$

$= 225 + 400$

$= 625$

$BC = 25cm$ [1/2]

Let OA = y cm and OB = x cm

$x^2+y^2 = 15^2$ [1/2]

$(25-x)^2 + y^2 = 20^2$ [1/2]

Solving we get x=9 and y=12 [1/2]

$\therefore$ OA= 12 cm and OB = 9 cm

Volume of double cone = $\frac{1}{3}\pi (OA)^2 \text{ X } OC + \frac{1}{3}\pi (OA)^2 \text{ X } OB$

$= \frac{1}{3} \text{ X } 3.14 \text{ X } (12)^2 \text{ X } (OC + OB)$ [1/2]

$= \frac{1}{3} \text{ X } 3.14 \text{ X } 144 \text{ X } 25$

$= 3768 \text{ cm}^3$ [1/2]

Surface area of double cone = π X OA X AC + π X OA X AB

$= \pi \text{ X } 12 \text{ X } 20 + \pi \text{ X } 12 \text{ X } 15$ [1/2]

$= 420 \pi \text{ cm}^2$

$= 1318.8 \text{ cm}^2$ [1/2]