PRE-BOARD EXAMINATION MARKING SCHEME (2018-19)

CLASS X

MATHEMATICS

General Instructions:

1. *The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the meaning, such answers should be given full weightage*
2. *Evaluation is to be done as per instructions provided in the marking scheme. It should not be done according to one's own interpretation or any other consideration — Marking Scheme should be strictly adhered to and religiously followed.*
3. *Alternative methods are accepted. Proportional marks are to be awarded.*
4. *If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.*
5. *A full scale of marks - 0 to 90 has to be used. Please do not hesitate to award full marks if the answer deserves it.*
6. *Separate Marking Scheme for all the three sets has been given.*
7. *As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.*

SECTION A

1. $4\sqrt{2}x^2 + 8x + 2\sqrt{2} = 0.$

   Discriminant $= 8^2 - 4\ X\ 4\sqrt{2}\ X\ 2\sqrt{2}$ ½

   $= 64 - 64$

   $= 0$ ½

   OR

   $ax^2 - 5x + c = 0$

   $\frac{-(-5)}{a} = \frac{c}{a} = 10$ ½

   $a = \frac{1}{2}, c = 5$ ½

2. Possible values of 'r' are 0, 1, 2 1

3. $k + 10 - 2k = 3k + 2 - k - 10$ ½

   $10 - k = 2k - 8$

K = 6 ½

4. $ar(\Delta) = \frac{1}{2}|0(0-5) + 4(5-0) + 0(0-0)|$ ½

$= \frac{1}{2}|-5 + 20|$

=7.5 sq. units ½

5. $\tan\theta = \frac{6}{2\sqrt{3}} = \frac{3}{\sqrt{3}} x \frac{\sqrt{3}}{\sqrt{3}} = \sqrt{3}$ ½

So $\theta = 60^0$ ½

OR

As $\angle C = 90^0$, A + B = 90^0 ½

So cos(A + B) = cos 90^0 = 0 ½

6. Ratio of perimeters of two Δs = 4 : 25

So Ratio of corresponding sides of Δs = 4 : 25 ½

Ratio of the areas = $4^2 : 25^2$

= 16 : 625 ½

SECTION B

7. If 4^n ends with digit 0, It must have 2 and 5 both as its factors. 1

now $4^n = 2^{2n}$ has only prime factor 2

Also by fundamental theorem of arithmetic, this factorization is unique

So 4^n can not end with digit 0 1

OR

7 x 6 x 5 x 4 + 5 = 5(7 x 6 x 4 +1) = 5 x 169 = 5 x 13 x 13 1

By Fundamental Theorem of Arithmetic, 7 x 6 x 5 x 4 + 5 is a composite number 1

8. As lines are coincident

$\frac{k+1}{5} = \frac{3k}{k} = \frac{15}{5}$ 1

So $\frac{k+1}{5} = \frac{15}{5}$

k = 14 1

9. $S_n = 3n^2 + 6n$

$S_{n-1} = 3(n-1)^2 + 6(n-1)$

$= 3n^2 - 3$ 1

Let n^{th} term be a_n

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

$= 6n + 3$ 1

OR

$a = 18$, $d = -2$ $\frac{1}{2}$

$S_n = 0$

So $\frac{n}{2}[36 + (n-1)(-2)] = 0$ $\frac{1}{2}$

$n(38 - 2n) = 0$

$n = 19$ 1

10. Let (-3, p) divides line segment joining (-5, -4) and (-2, 3) in the ratio k : 1

$(-3, p) = \left[\frac{-2k-5}{k+1}, \frac{3k-4}{k+1}\right]$ 1

$\frac{-2k-5}{k+1} = -3$ 1/2

$k = 2$

So required ratio is 2 : 1 ½

11. Possible outcomes – [HH, HT, TH, TT]

(i) Favorable outcomes – [HH, HT, TH]

P(at least one head) = ¾ 1

(ii) Favorable outcomes – [HT, TH, TT]

P(at most one head) = ¾ 1

12. Given word – MATHEMATICS

(i) no. of vowels = 4

P(vowel) = 4/11 1

(ii) no. of consonants = 7

P(consonant) = 7/11 1

SECTION C

13. Suppose $2 + \sqrt{5}$ is a rational number

$2 + \sqrt{5} = \frac{p}{q}$ where p and q are coprime integers, $q \neq 0$ 1/2

$\sqrt{5} = \frac{p-2q}{2}$ 1

$\frac{p-2q}{2}$ is a rational number and $\sqrt{5}$ is an irrational number 1

So our supposition is wrong

$2+\sqrt{5}$is an irrational number ½

14. $p(x) = 4x^4 + x^3 - 72x^2 - 18x$

As $3\sqrt{2}$ and $-3\sqrt{2}$ are its zeros)

So $(x - 3\sqrt{2})$ and $(x + 3\sqrt{2})$ are its factors

Or $(x - 3\sqrt{2})(x + 3\sqrt{2})$ is its factor

Or $x^2 - 18$ is factor. 1

$p(x) = (x^2 - 18)\, q(x)$

$q(x) = 4x^2 + x$ $1\frac{1}{2}$

$= x(4x + 1)$

Other zeros are 0 and $-\frac{1}{4}$ ½

15. As A, B and C are collinear

ar(ΔABC) = 0

$\frac{1}{2}|-2(b+1) + a(-1-1) + 4(1-b)| = 0$

$a + 3b = 1$ $1\frac{1}{2}$

also $a - b = 1$

we get $b = 0$ and $a = 1$ $1\frac{1}{2}$

OR

$AB = \sqrt{(2+2)^2} = 4$

$BC = \sqrt{4+4} = 2\sqrt{2}$

$AC = \sqrt{4+4} = 2\sqrt{2}$ 1

$DE = \sqrt{8^2} = 8$

$EF = \sqrt{4^2+4^2} = 4\sqrt{2}$

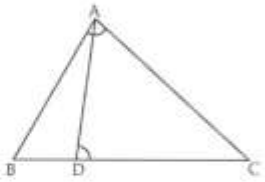
$DF = \sqrt{4^2+4^2} = 4\sqrt{2}$ 1

So $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{1}{2}$

So $\Delta ABC \sim \Delta DEF$ $(s.s.s.)$ 1

16. For correct graph 3

17.



In ΔBAC and ΔADC

$\angle C = \angle C$

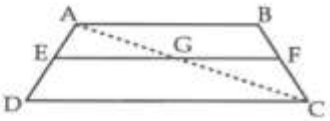
$\angle BAC = \angle ADC$ (given)

$\Delta BAC \sim \Delta ADC$ ($A.A. similarity\ rule$) $1\frac{1}{2}$

So $\frac{AC}{DC} = \frac{BC}{AC}$

$AC^2 = BC\ X\ DC$ $1\frac{1}{2}$

OR



ABCD is a trapezium with $AB \parallel EF \parallel CD$

Join AC

In ΔADC, EG ∥ DC

By B.P.T.

$\frac{AE}{DE} = \frac{AG}{CG}$ ..... (i) 1

In ΔACB , GF ∥ AB

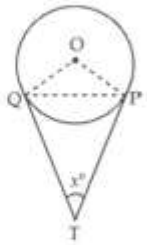
By B.P.T.

$\frac{AG}{GC} = \frac{BF}{CF}$ .....(ii) 1

From (i) and (ii)

$\frac{AE}{DE} = \frac{BF}{CF}$ 1

18.



Let $\angle PTQ = x$

In ΔPTQ, $\angle PQT + \angle QPT = 180^0 - x$ 1

But TP = TQ

So $\angle PQT = \angle QPT = \frac{1}{2}(180^0 - x) = 90^0 - \frac{x}{2}$ 1

$\angle OPT = \angle OPQ + \angle QPT$

$90^0 = \angle OPQ + 90^0 - \frac{x}{2}$

$x = 2\angle OPQ$

$\angle PTQ = 2\angle OPQ$ 1

19. $\frac{sec^2\theta - cot^2(90-\theta)}{cosec^2 67^0 - tan^2 23^0} + (sin^2 40^0 + sin^2 50^0)$

$= \frac{sec^2\theta - tan^2\theta}{cosec^2 67^0 - tan^2(90^0 - 67^0)} + (sin^2 40^0 + sin^2(90^0 - 40^0))$ $1\frac{1}{2}$

$= \frac{sec^2\theta - tan^2\theta}{cosec^2 67^0 - cot^2 67^0} + (sin^2 40^0 + cos^2 40^0)$

$= \frac{1}{1} + 1$

$= 2$ $1\frac{1}{2}$

OR

$3tan\theta = 4$

$tan\theta = \frac{4}{3}$

$\frac{4cos\theta - sin\theta}{2cos\theta + sin\theta}$

$= \frac{4 - tan\theta}{2 + tan\theta}$ (dividing numerator and denominator by $cos\theta$) $1\frac{1}{2}$

$= \frac{4 - \frac{4}{3}}{2 + \frac{4}{3}}$

$= 4/5$ $1\frac{1}{2}$

20.

C.I.:	0 - 20	20 - 40	40 - 60	60 - 80	80-100
f:	7	p	10	9	13
x:	10	30	50	70	90
fx:	70	30p	500	630	1170

1

$\sum fx = 2370 + 30p$

$\Sigma f = 39 + p$ 1/2

$mean = \frac{\Sigma fx}{\Sigma f}$ 1/2

$54 = \frac{2370 + 30p}{39 + p}$

p = 11 1

21. PQ = QR = SR = 4 cm.

ar(semicircle with PQ as diameter) = $\frac{1}{2}\pi \; X \; 2^2 = 2\pi \; sq.cm.$ 1/2

ar(semicircle with QS as diameter) = $\frac{1}{2}\pi \; X \; 4^2 = 8\pi \; sq.cm.$ 1/2

ar(semicircle with PS as diameter) = $\frac{1}{2}\pi \; X \; 6^2 = 18\pi \; sq.cm.$ 1/2

ar(shaded region) = $18\pi - 8\pi + 2\pi$

$= 12\pi$

= 37.71 sq. cm. $1\frac{1}{2}$

22. Diameter of sphere carved out = side of cube

= 7 cm. 1/2

So r = 7/2 cm.

Volume of cube = 7 X 7 X 7 = 343 cu.. cm. 1/2

Volume of sphere = $\frac{4}{3}\pi r^3$ 1/2

$= \frac{4}{3} \; X \; \frac{22}{7} \; X \; \frac{7}{2} \; X \; \frac{7}{2} \; X \; \frac{7}{2}$

= 179.67 cu. cm. 1

Volume of wood left = 343 – 179.67

= 163.33 cu. cm. ½

OR

Volume of water in the conical vessel = $\frac{1}{3} \; X \; \frac{22}{7} \; X \; 25 \; X \; 24 \; cm^3$ 1

Let h be the height to which the water will rise in the cylindrical vessel

So $\frac{1}{3} X \frac{22}{7} X 25 X 24 = \frac{22}{7} X 10 X 10 X h$ 1

h = 2 cm. 1

SECTION D

23. Let the digit at ten's place of two digit number be x

Product of digits = 18

So the digit at one's place = $\frac{18}{x}$

Original number = $10x + \frac{18}{x}$ 1/2

New number formed by interchanging the digits = $\frac{180}{x} + x$ 1/2

$\frac{180}{x} + x = 10x + \frac{18}{x} - 63$ 1/2

$x^2 - 7x - 18 = 0$ $1\frac{1}{2}$

$(x - 9)(x+2) = 0$

$x = 9$ or $x = -2$

rejecting negative value

digit at ten's place = 9

digit at one's place = 2

required number is 92 1

OR

Seven years ago, let Swati's age be x years

So Varun's age (seven years ago) = $5x^2$ years

Swati's present age = (x + 7) years

Varun's present age = $(5x^2 + 7)$ years

Three years hence, Swati's age = (x + 10) years

Varun's age (three years hence) = $5x^2 + 10$ 1

$x + 10 = \frac{2}{5}(5x^2 + 10)$

$2x^2 - x - 6 = 0$ 2

$(x - 2)(2x + 3) = 0$

$x - 2 = 0$ but $2x + 3 \neq 0$ as $x > 0$

$x = 2$

So Swati's present age = 2 + 7 = 9 years

Varun' present age = $5 \times 2^2 + 7 = 27$ years 1

24. The given sequence is an A.P. with a = 20 and d = -3/4 1/2

Let a_n be the first negative term

$a_n < 0$

$20 + (n-1)(-3/4) < 0$ 1/2

$\frac{83}{4} - \frac{3n}{4} < 0$

$n > 27\frac{2}{3}$

$n = 28$

28^{th} term is the first negative term 3

25. Given , to prove , construction and figure. ½ x 4 = 2

Correct proof 2

OR

Given , to prove , construction and figure. ½ x 4 =2

Correct proof 2

26. Correct construction of given triangle 2

Correct construction of triangle similar to given triangle 2

27. L.H.S.

$= \frac{\cot A + cosec\ A - 1}{\cot A - cosec\ A + 1}$

$= \frac{(\cot A + cosec\ A) - (cosec^2 A - cot^2 A)}{\cot A - cosec\ A + 1}$ 1

$= \frac{(\cot A + cosec\ A) - (\cot A + cosec\ A)(-\cot A + cosec\ A)}{\cot a - cosec\ A + 1}$

$= \frac{(\cot A + cosec\ A)(1 + cot A - cosec A}{cot A - cosec\ A + 1}$

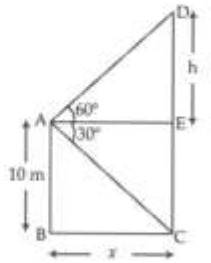
$= \cot A + cosec\ A$ 2

$= \frac{\cos A}{\sin A} + \frac{1}{sin A}$

$= \frac{cos A + 1}{sin A}$ 1

= R.H.S.

28.



1

In ΔAED, $tan60^0 = \frac{DE}{AE}$

$\sqrt{3} = \frac{h}{x}$

$h = x\sqrt{3}$m 1

In ΔAEC, $\tan 30^0 = \frac{CE}{AE}$

$\frac{1}{\sqrt{3}} = \frac{10}{x}$

$x = 10\sqrt{3}$

$h = 10\sqrt{3}.\sqrt{3} = 30m$

height of hill = 30 + 10 = 40 m.

Distance of hill from the ship = $10\sqrt{3}$ m. 2

29. Volume of bucket (frustum) = 28.490 L = 28.490 X 1000 cm^3 = 28490 cm^3 1/2

Radius of top ,r_1= 28 cm.

Radius of bottom ,r_2= 21 cm.

$V = \frac{1}{3}\pi h(r_1^2 + r_1 r_2 + r_2^2)$ 1

$28490 = \frac{1}{3} X \frac{22}{7} X h(28^2 + 28x21 + 21^2)$

$\frac{28490x3x7}{22} = h(784 + 588 + 441)$

$\frac{28490x3x7}{22} = h X 1813$

h = 15 cm. $2\frac{1}{2}$

30.

Distance(in m):	< 20	< 40	<60	< 80	< 100	
No. of Students:	6	17	34	46	50	2

Correct graph 2

OR

Weight (in kg)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 75
Number of students	2	3	8	6	6	3	2
Cumulative frequency	2	5	13	19	25	28	30

1

$\sum f_i = n = 30$and n/2 = 15

So 55 – 60 is median class 1

l = 55 ,cf = 13 , f = 6 , h = 5

$Median = l + \left(\frac{\frac{n}{2} - cf}{f}\right) X\ h$ 1

$Median = 55 + \left(\frac{15-13}{6}\right) X\ 5$

= 56.67 kg 1