CBSE Sample Paper-03 (solved)
SUMMATIVE ASSESSMENT –I
MATHEMATICS
Class – IX

Time allowed: 3 hours Maximum Marks: 90

General Instructions:

a) All questions are compulsory.
b) The question paper comprises of 31 questions divided into four sections A, B, C and D. You are to attempt all the four sections.
c) Questions 1 to 4 in section A are one mark questions.
d) Questions 5 to 10 in section B are two marks questions.
e) Questions 11 to 20 in section C are three marks questions.
f) Questions 21 to 31 in section D are four marks questions.
g) There is no overall choice in the question paper. Use of calculators is not permitted.

Section A

Q1. Convert $\sqrt{600}$ into simplest form

Q2. If x+y+z = 0, then $x^3 + y^3 + z^3$ is

Q3. In a ΔABC, if $\angle A = 45^0$ and $\angle B = 70^0$. Determine the shortest sides of the triangles.

Q4. The point (3,0) lies on

Section B

Q5. Which of the following rational numbers have the terminating decimal representation?

a) $\frac{6}{10}$

b) $\frac{14}{40}$

Q6. Find the zeroes of the polynomial $5x + 2x^2 + 3$.

Q7. Prove that if a quantity B is a part of another quantity A, then A can be written as the sum of B and some third quantity C.

Q8. Two supplementary angles are in the ratio $4:5$. Find the angles.

Q9. If the bisectors of apair of corresponding angles formed by a transversal with two given lines are parallel, prove that the given lines are parallel.

Q10. Prove that angles opposite to two equal sides of a triangle are equal.

Section C

Q11. Represent $\sqrt{5}$ on the number line.

Q12. For the identity $\frac{7+\sqrt{5}}{7-\sqrt{5}}-\frac{7-\sqrt{5}}{7+\sqrt{5}}=a+7\sqrt{5}b$. Find the value of a and b.

Q13. Find $p(0), p(1), p(2)$ for the polynomial $p(y)=y^2-y+1$.

Q14. Factorise : $2a^4-32$

Q15. Prove that the bisectors of the angles of a linear pair are at right angles.

Q16. Prove that if a transversal intersects two parallel lines, then each pair of interior angles on the same side of the transversal is supplementary.

Q17. Prove that the medians of an equilateral triangle are equal.

Q18. If the altitudes from two vertices of a triangle to the opposite sides are equal, prove that the triangle is isosceles.

Q19. Plot the points $P(7,0), Q(0,0), R(0,6)$. Name the figure obtained on joining the points P, Q, R. If possible, find the area of the figure obtained.

Q20. Area of a given triangle is a_1 sq. units. If the sides of this triangle be doubled, then the area of the new triangle becomes a_2 sq. units. Prove that $a_1 : a_2 = 1:4$. Also find the percentage increase in area.

Section D

Q21. Express each of the following mixed recurring decimals in the form $\frac{p}{q}$

a) $4.3\overline{2}$

b) $0.\overline{36}$

Q22. Prove that $\sqrt{7}$ is an irrational number.

Q23. Which of the following polynomials has $(x+1)$ as a factor.

a) x^3+x^2+x+1

b) $x^4+3x^3+3x^2+x+1$

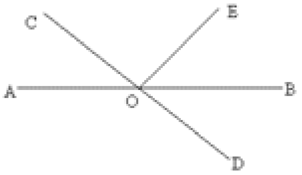
Q24. Factorise: x^3-3x^2-9x-5

Q25. If x^3+ax^2+bx+6 has $x-2$ is a factor and leaves a remainder 3 when divided by $x+3$. Find the values of a and b.

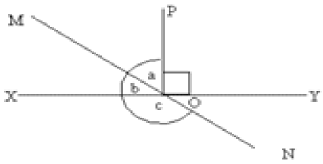
Q26. Factorise :

a) $x^3\left(y-z\right)^3+y^3\left(z-x\right)^3+z^3\left(x-y\right)^3$ b) x^6-y^6

Q27. In the figure, lines AB and CD intersect at O. If $\angle AOC+\angle BOE=70^\circ$ and $\angle BOD=40^\circ$, find $\angle BOE$ and reflex $\angle COE$.



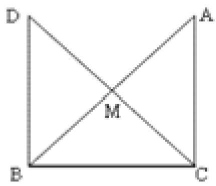
Q28. In the following figure, lines XY and MN intersect at O. If $\angle POY=90^\circ$ and $a:b=2:3$, find c.



Q29. In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B. Show that:

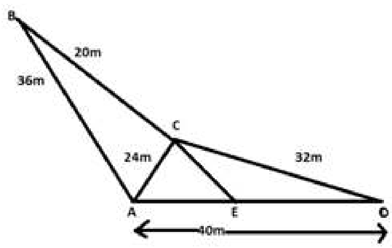
(i) $\Delta\text{AMC}\cong\Delta\text{BMD}$ (ii) $\angle\text{DBC}$ is a right angle

(iii) $\Delta\text{DBC}\cong\Delta\text{ACB}$ (iv) $\text{CM}=\frac{1}{2}\text{AB}$



Q30. Prove that difference of any two sides of a triangle is less than the third side.

Q31. Outside a mela, $ABCD$ is a ground, where three types of vehicles are parked. Cars are parked in the triangular region ABC. Scooters and motorbikes are parked in the triangular region AEC and bicycles in the triangular region ECD. If E is the mid point of the side AD, how much area is used for parking cars, scooters, motor bikes and bicycles.



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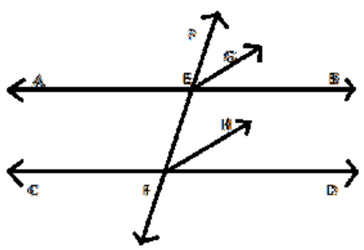
ANSWER KEY

1. $10\sqrt{6}$
2. 2xyz
3. BC
4. +ve x axis
5. Both have terminating decimal representation.
6. Splitting the middle term, we get $x = -1, \frac{-3}{2}$
7. Prove it yourself.
8. Two supplementary angles are $80°, 100°$.
9. **Given**: AB and CD are two lines where as PQ is a transversal line which intersect AB at E and CD at F point, $EG \parallel FH$.



To prove: $AB \parallel CD$

Proof: $EG \parallel FH$

$\Rightarrow \angle PEG = \angle EFH$ (corresponding angles)

$\Rightarrow \angle GEB = \angle HFD$

$\Rightarrow 2\angle GEB = 2\angle HFD$

$\Rightarrow \angle PEB = \angle EFD$ ($\therefore \angle GEB = \frac{1}{2}\angle PEB$ and $\angle HFD = \frac{1}{2}\angle EFD$)

But, these are corresponding angles where AB and CD are intersected by the transversal PQ.

$\because AB \parallel CD$ (corresponding angles axiom)

10. Prove it yourself.

11. Do it yourself.

12. Rationalising the identity and equating with RHS of the identity, we get $a=0, b=\frac{1}{11}$

13. $p(0)=1,\ p(1)=1,\ p(2)=3$

14. $2a^4-32=2(a^4-16)$

$=((a^2)^2-(4)^2)$

$=(a^2-4)(a^2+4)\ (\because a^2-b^2=(a-b)(a+b))$

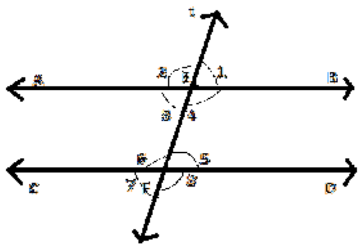
$=((a)^2-(2)^2)(a^2+4)$

$=(a-2)(a+2)(a^2+4)\ (\because a^2-b^2=(a-b)(a+b))$

15. Do it yourself.

16. **Given**: $AB \parallel CD$ and a transversal t intersects AB at E and CD at F forming two pairs of consecutive interior angles i.e $\angle 3, \angle 6$ and $\angle 4, \angle 5$.

To prove: $\angle 3+\angle 6=180°, \angle 4+\angle 5=180°$



Proof: Since ray EF stands on line AB, we have $\angle 3+\angle 4=180°$ (linear pair)

But $\angle 4=\angle 6$ (alt. int angles)

$\therefore \angle 3+\angle 6=180°$

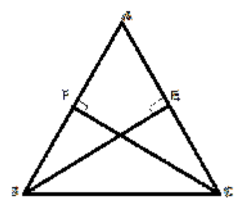
Similarly, $\angle 4+\angle 5=180°$.

Hence proved.

17. Prove it yourself.

18. **Given**: A ΔABC in which altitudes BE and CF from B and C resp. on AC and AB are equal.

To prove: ΔABC is isosceles i.e $AB=AC$.



Proof: In ΔABC and ΔACF, we have

$\angle AEB=\angle AFC=90°$

$\angle BAE=\angle CAF\ (common)$

$BE = CF\,(given)$

$\therefore \Delta ABE \cong \Delta ACF$ (by AAS)

$\therefore AB = AC$ (by CPCT)

Hence, ΔABC is isosceles.

19. 21 sq.units

20. Let a_1 be the original area of triangle and a_2 be the new area

Let b be the base and h be the height.

$$a_1 = \frac{bh}{2}$$

$$a_2 = \frac{1}{2} \times 2b \times 2h = 2bh$$

Increase in area $= 2bh - \frac{bh}{2} = \frac{3bh}{2}$

Ratio: $\frac{a_1}{a_2} = \frac{bh/2}{2bh} = \frac{bh}{4bh} = \frac{1}{4}$

$\therefore a_1 : a_2 = 1:4$

Percentage increase: $\frac{3bh/2}{bh/2} \times 100 = 300\%$

21. Do it yourself

22. Do it yourself.

23.

a) $x+1$ is a factor as $p(-1) = 0$

b) $x+1$ is not a factor as $p(-1) \neq 0$

24. Using trial and error method, we get $p(-1) = 0$

$\Rightarrow x+1$ is a factor of $p(x)$

Dividing $x^3 - 3x^2 - 9x - 5$ by $x+1$, we get $x^2 - 4x - 5$ as the quotient

$\therefore p(x) = (x+1)(x^2 - 4x - 5)$

Splitting the middle term, we get

$p(x) = (x+1)^2 (x-5)$

25. $a=\frac{1}{5}, b=\frac{-37}{5}$

26. Let $x(y-z)=a, y(z-x)=b, z(x-y)=c$

$\therefore a+b+c=0$

Using the identity: if $a++c=0 \therefore a^3+b^3+c^3=3abc$

$\therefore x^3(y-z)^3+y^3(z-x)^3+z^3(x-y)^3=3xyz(y-z)(z-x)(x-y)$

27. Given:- $\angle AOC=\angle BOE=70°$ .... equation (i)

And $\angle BOD=40°$

Now, putting the value of equation (ii) in equation (i),

$\angle AOC=\angle BOE=70°$

$\Rightarrow 40°+\angle BOE=70°$

$\Rightarrow \angle BOE=70°-40°$

$\Rightarrow \angle BOE=30°$

Now, $\angle AOC+\angle BOE+\angle COE=180°$

(Angles at a common point on a line)

$\Rightarrow 70°+\angle COE=180°$

$\Rightarrow \angle COE=180°-70°$

$\Rightarrow \angle COE=110°$

Reflex $\angle COE=360°-110°=250°$

Hence, $\angle BOE=360°$

And reflex $\angle COE=250°$

28. Given:- $\angle POY=90°$

And a : b = 2 : 3

Therefore, $\frac{a}{b}=\frac{2}{3}$

$\Rightarrow a=\frac{2}{3}b$ ……………………….. equation (i)

Now, $\angle POX+\angle POY=180°$

$\angle POX+90°=180°$

$\angle POX=180°-90°$

$\angle POX=90°$

$a+b=90°$ (therefore, $\angle POX = a+b$)

$\frac{2}{3}b+b=90°$

$\frac{2b+3b}{3}=90°$

= 2b + 3b = $90°\times3$

= 5b = $270°$

$=b=\frac{270°}{5}$

$\Rightarrow b=54°$

Putting the value of b in equation (i)

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

Or, $a=\frac{2}{3}\times54°=36°$

Now, $b+c=180°$ {Angles at a common point on a line}

$\Rightarrow c=126°$

Q29. In ΔAMC and ΔBMD

BM = AM (M is midpoint)

DM = CM (given)

$\angle DMB=\angle AMC$ (opposite angles)

So, $\Delta AMC\cong\Delta BMD$

Hence, DB = AC

$\angle DBA=\angle BAC$

So, DB || AC (altenate angles are equal)

So, $\angle BDC=\angle ACB$ = right angle

(internal angels are complementary in

Case of tranversal of parallel lines)

ΔDBC and ΔACB

DB = AC (proved earlier)

BC = BC (Commo side)

$\angle BDC=\angle ACB$ (proved earlier)

So, $\Delta DBC \cong \Delta ACB$

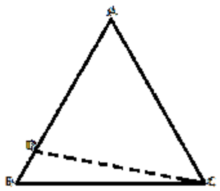
So, AB = DC

SO, AM = BM = CM = DM

So, $CM = \frac{1}{2} AB$

30. **To prove**: $AB - AC < BC$

Construction: From AB cut $AD = AC$. Join D and C



Proof: $AD = AC$

$\Rightarrow \angle ADC = \angle ACD$ (angles opposite to equal sides are equal)

In ΔADC, ext. $\angle BDC > \angle ACD$ (ext. angle of a triangle is greater than its int. opp. Angle)

$\Rightarrow \angle BDC > \angle ADC$

Similarly, in ΔBDC

Ext. $\angle ADC > \angle BCD$

$\Rightarrow \angle BDC > \angle ADC > \angle BCD$

$\Rightarrow \angle BDC > \angle BCD$

$\therefore$ In $\Delta BDC, \angle BDC > \angle BCD$

$\Rightarrow BC > BD$

$BD < BC$

$AB - AD < BC$

$AB - AC < BC (\because AD = AC)$

31. Using heron's formula, area of $\Delta ABC = 160\sqrt{2} sq.m$

Area of $\Delta ACD = 384 sq.m$

Since E is the mid-point of AD and CE is the bisector,

$\therefore ar(\Delta ACE) = ar(\Delta ECD) = \frac{1}{2} ar(\Delta ACD)$

$\therefore ar(\Delta ACE) = ar(\Delta ECD) = \frac{1}{2} ar(\Delta ACD) = 192 sq.m$