Sample Paper - 10

GENERAL INSTRUCTIONS

All questions are compulsory.
The question paper consist of 30 questions divided into four sections A, B, C and D. Section A comprises of 6 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 8 questions of 4 marks each.
There is no overall choice.
Use of calculator is not allowed.

SECTION-A

(1 mark each)

1. Find the perfect square numbers between : 30 and 40

2. Factorise: $12x+36$

3. Classify the following polynomials as monomials, binomials, trinomials,
$-z+5, x+y+z, y+z+100, ab-ac, 17$

4. What is Euler formula.

5. Write 0.000005678 in the standard form.

6. If the division $N \div 2$ leaves a remainder of 1, what might be the one's digit of N?

SECTION-B

(2 marks each)

7. Simplify : $\frac{16}{39}+\frac{9}{-26}$

8. (a) Express 49 as the sum of 7 odd numbers.
(b) Express 121 as the sum of 11 odd number.

9. 72% of 25 students are good in Mathematics. How many are not good in Mathematics?

10. Find the value of x, $10000x = (9982)^2 - (18)^2$

11. Factorise the following :
(a) $18+11x+x^2$
(b) $y^2-2y-15$

12. Find the area of a rhombus whose side is 5 cm and whose altitude is 4.8 cm. If one of its diagonal is 8 cm long, find the length of the other diagonal.

SECTION-C

(3 marks each)

13. The sum of two rational numbers is $-\frac{4}{5}$. if one of them is $\frac{-11}{20}$, find the other.

14. Simplify and solve the following :

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

15. Construct the following quadrilaterals

Quadrilateral ABCD

AB = 4.5 cm

BC = 5.5 cm

CD = 4 cm

AD = 6 cm

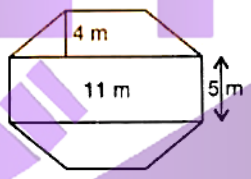
AC = 7 cm

16. Parikshit makes a cuboid of plasticine of sides 5 cm, 2 cm, 5 cm. How many such cuboids will be need to form a cube?

17. During a sale, a shop offered a discount of 10% on the market price of all the items. What would a customer have to pay for a pair of jeans market at Rs. 1450 and two shirts marked at Rs. 850 each.

18. Divide : $15(y+3)(y^2-16)$ *by* $5\ (y^2-y-12)$

19. Top surface of a raised platform is in the shape of a regular octagon as shown in the figure. Find the area of the octagonal surface.



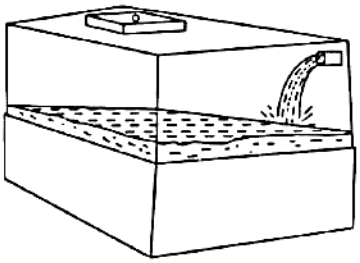
20. By what number should $\left(-\frac{3}{2}\right)^{-3}$ be divided so that the quotient is $\left(\frac{9}{4}\right)^{-2}$?

21. Two persons could fit new windows in a house in 3 days.

(a) One of the persons fell ill before the work started. How long would the job take now?

(b) How many persons would be needed to fit the windows in one day?

22. Water is pouring into a cuboidal reservoir at the rate of 60 litres per minute. If the volume of reservoir is 108 m3, find the number of hours it will take to fill the reservoir.



SECTION-D

(4 marks each)

23. Let a, b, c, be the three rational numbers where a $a=\frac{2}{3}, b=\frac{4}{5}$ and $c=-\frac{5}{6}$.

Verify:

(a) $a+(b+c)=(a+b)+c$ (Associative property of addition).

(b) $a\times(b\times c)=(a\times b)\times c$ (Associative property of multiplication).

24. (a) After 12 years I shall be 3 times as old as I was 4 years ago. Find my present age.

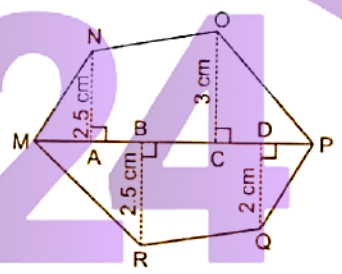
(b) Verify that $x = 4$ is a root of the equation $2x-3=5$.

25. The students of Anju's class sold posters to raise money. Anju wanted to create a ratio for finding the amount of money her class would make for different numbers of posters sold. She knew they could raise Rs. 250 for every 60 posters sold.

(a) How much money would Anju's class make for selling 102 posters?

(b) Could Anju's class raise exactly Rs. 2,000? If so, how many posters would they need to sell? If not, why?

26. Find the area of polygon MNOPQR, if MF = 9 cm, MD = 7 cm, MC = 6 cm, MB = 4 cm, MA = 2 cm.



NA, OC, QD and RB are perpendiculars to diagonal MP.

27. Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him Rs. 50 per metre and trouser material that costs him Rs. 90 per metre. For every 3 metres of the shirt material he buys 2 metres of the trouser material. He sells the materials at 12% and 10%, respectively. His total sale is Rs. 36,600. How much trouser material did he buy?

28. Construct a parallelogram ABCD in which AB =4 cm, BC = 5 cm and B = 60°.

29. Find the volume of cuboid whose dimensions are $(x^2-2), (2x+2)$ *and* $(x-1)$.

30. Factorise and divide the following:

(a) $(2x^3-12x^2+16x)\div(x-2)(x-4)$

(b) $(3x^4-1875)\div(3x^2-75)$

Solutions

Section 'A'

(1 mark each)

1. The perfect square numbers between 30 and 40 is 36. **1**

2. $12x+36$

$$12x = 2\times2\times3\times x$$
$$36 = 2\times2\times3\times3$$

The common factors of the three terms are 2, 2 and 3.

Therefore,

$12x+36=(2\times2\times3\times x)+(2\times2\times3\times3)$

$$=2\times2\times3\ (x+5)$$

$=12(x+3)$ **1**

3. (i) 17 is monomial

(ii) $-z+5$ and $ab-ac$, $y+z+100$ are binomials.

(iii) $x+y+z$ is trinomial. **1**

4. Euler's formula for any polyhedron is,

$F+V-E=2$

where F stands for number of faces, V for number of vertices and £ for number of edges. **1**

5. $0.000005678=\frac{5678}{1000000000}=\frac{5.678}{10^9}\times10^3$ **½**

$=5.678\times10^{-6}$ **½**

6. N is odd; so its one's digit is odd. Therefore, the one's digit must be 1,3,5,7 or 9. **1**

Section 'B'

(2 marks each)

7. We have $\frac{16}{39}+\frac{9}{(-26)}=\frac{16}{39}+\frac{-9}{26}$ **½**

Now, the LCM of 39 and 26 is 78.

∴ Rewritine $\frac{16}{39}$ and $\frac{-9}{26}$ in such a manner they have the same denominator 78.

$\frac{16}{39}=\frac{16\times2}{39\times2}=\frac{32}{78}$ **½**

$\frac{-9}{26}=\frac{-9\times3}{26\times3}=\frac{-27}{78}$

$$\frac{16}{39}+\frac{-9}{26}=\frac{32}{78}+\frac{(-27)}{78}$$ ½

$$=\frac{32+(-27)}{78}$$

$$=\frac{32-27}{78}=\frac{5}{78}$$ ½

8. $49=1+3+5+7+9+11+13$ **1**

$121=1+3+5+7+9+11+13+15+17+19+21$

1

9. Given, 72% of 25 students are good in Mathematics, then real value of students are good in Mathematics = 72% of 25

$$=\frac{72}{100}\times 25$$

$=18$ students are good in Mathematics **1**

Students who are not good in Mathematics = Total students − Students good in Mathematics

$=25-18$

$=7$ **1**

10. R.H.S $=(9982)^2-(18)^2$

$=(9982+18)(9982-18)$

$[Since,\ a^2-b^2=(a+b)(a-b)]$

$=(10000)\times(9964)$ **1**

L.H.S $=(10000)\times x$

Comparing L.H.S. and R.H.S, we get

$10000x = 10000\times 9964$

or x $=\frac{10000\times 9964}{10000}=9964$ **1**

11. (a) $18+11x+x^2 = x^2+11x+18$

$=x^2+(9+2)\,x+18$

$=x^2+9x+2x+18$ ½

$=x(x+9)+2\,(x+9)$

$=(x+9)\,(x+2)$ ½

(b) $y^2-2y-15=y^2-(5-3)y-15$

$=y^2-5y+3y-15$ ½

$=y(y-5)+3(y-5)$

$=(y-5)(y+3)$ ½

12. We have. Area of rhombus = base × altitude

$=5\times 4.8$

$=24\ cm^2$ **1**

Also, Area of rhombus $=\frac{1}{2}d_1d_2$

24 $=\frac{1}{2}\times 8\times d_2$

$\Rightarrow d_2 = \frac{24\times 2}{8} = 6$ cm

$\therefore$ Area of rhombus $= 24\ m^2$

Other diagonal of rhombus = 6 cm. **1**

Section 'C'

(3 marks each)

13. $\because -\frac{11}{20}$ + (a rational number) $= -\frac{4}{5}$

$\therefore$ The required rational number

$= -\frac{4}{5} - \left(\frac{-11}{20}\right)$ **1**

$= -\frac{4}{5} + \frac{11}{20}$ $\left[\because \text{Additive inverse of } \frac{-11}{20} \text{ is } \frac{11}{20}\right]$

$= \frac{-4\times 4+11}{20}$ [$\because$ LCM of 5 and 20 is 20]

$= \frac{-16+11}{20}$

$= \frac{-5}{20}$ or $\frac{-1}{4}$ **1**

Thus, the other rational number $= -\frac{1}{4}$.

14. $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$

or, $\frac{3t-2}{4} - \frac{2t+3}{3} + t = \frac{2}{3}$

[Transposing t to LHS]

or, $\frac{3(3t-2)-4(2t+3)+12t}{12} = \frac{2}{3}$ **1**

or, $9t-6-8t-12+12t = \frac{2}{3}\times 12$

or, $13t-18 = 8$

or, $13t = 8+18$

or, $13t = 26$

or, $t = \frac{26}{13}$ or, $t = 2$ **1**

To check

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

or, $\frac{3\times 2-2}{4} - \frac{2\times 2+3}{3} = \frac{2}{3} - 2$

or, $\frac{6-2}{4}-\frac{4+3}{3}=\frac{2}{3}-2$

or, $1-\frac{7}{3}=\frac{2}{3}-2$

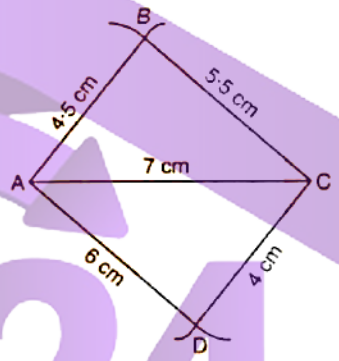
or, $\frac{3-7}{3}=\frac{2-6}{3}$

or, $\frac{-4}{3}=\frac{-4}{3}$

or, LHS = RHS **1**

15. Steps of construction :

(1) First, we draw ABC using SSS construction condition.



(2) Now, we have to locate the fourth point D. This 'D' would be on the side opposite to B with reference to AC. **1**

(3) D is 6 cm away from A. So, draw an arc of radius 6cm. D is 4 cm away from A. So, draw an arc of radius 4 cm.

(4) D should be lie on both the arcs drawn. So, its the point of intersection of the two arcs. ABCD is the required quadrilateral. **1**

16. The sides of a cuboid are 5 cm, 2 cm, 5 cm.

Let Parikshit needs n such type of cuboid to make it cube.

Hence, the volume of cuboids $= n\times5\times2\times5$ **1**

Since, this volume forms a cube and the volume of a cube is a perfect cube, of positive integer. To form $5\times5\times2$ a perfect cube, we need the factor $5\times2\times2=20$. Hence, n = 20. **1**

Therefore, Parikshit needs 20 such type of cuboids to make it cube. **1**

17. The market price of jeans = Rs. 1450

Discount % = 10%

Discount value $=\frac{10}{100}\times1450=$ Rs. 145 **1**

S.P after 10% discount = 1450 −145 = Rs. 1305

The market price of 2 shirts = 2×850 = Rs. 1700

$Discount\ on\ two\ shirts = \frac{Rate\times MP}{100}=\frac{10\times1700}{100}$

= Rs. 170 **1**

∴ S. P. of two shirts = Rs. 1700 – RS.170 = Rs. 1530

∴ The customer had to pay = Rs. 1305 + Rs. 1530 =Rs.2835 **1**

18. Factorising $15(y+3)\ (y^2-16)$,

We get, $5\times3\times(y+3)(y-4)(y+4)$

On factorising, $5(y^2-y-12)$, we get

$5(y^2-4y+3y-12)$

$=5[y(y-4)+3(y-4)]$

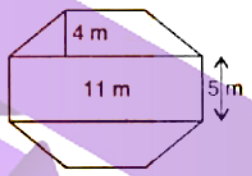
$=5(y-4)(y+3)$ **1**

Therefore, on dividing the first expression by the second expression, we get $\frac{15(y+3)(y^2-16)}{5(y^2-y-12)}$

$=\frac{5\times3\times(y+3)(y-4)(y+4)}{5\times(y-4)(y+3)}$ **1**

$=3(y+4)$ **1**

19. Each side of octagon surface = 5 m



Area of octagon = 2(Area of trapezium) + Area of rectangle **1**

$=2\times\frac{1}{2}\times h\times$ (sum of parallel side) $+1\times b$

$=4\times(5+11)+11\times5$ **1**

$= 64 + 55$

$= 119\ m^2$

Area of octagon surface = 119 cm^2. **1**

20. Let the required number = x

According to problem,

$\left(\frac{-3}{2}\right)^{-3}\div x=\left(\frac{9}{4}\right)^{-2}$

or $\left(\frac{2}{-3}\right)^{-3}\div x=\left(\frac{4}{9}\right)^{2}$ **1**

or $\frac{8}{-27}\times x^{-1}=\frac{16}{81}$ $\left[\because \frac{1}{x^a}=x^{-a}\right]$

or $x^{-1}=\frac{16}{81}\times\frac{-27}{8}$ **1**

or $x^{-1}=\frac{-2}{3}$

or $\frac{1}{x}=\frac{-2}{3}$

or $x=\frac{-3}{2}$

Hence, required number $=\frac{-3}{2}$ **1**

21. (a) Let the job take x days.

No. of persons	2	1
Days	3	x

More the persons, the lesser the days. Hence, this is a case of inverse proportion

So, $2\times3=1\times x$

$\Rightarrow$ x = 6

Thus, the job would take 6 days. $1^{1/2}$

(b) Let x persons needed to fit the windows in one day

No. of persons	2	x
Days	3	1

This is case of inverse proportion

$\therefore$ $2\times3=x\times1$

$\Rightarrow$ $x=6$

Thus, 6 persons would be needed. $1^{1/2}$

22. Given, Volume of reservoir = 108 m^3

Volume of water = $108\times1000\ L$

= 108000 L **1**

60 litres water filled reservoir in 1 minute

108000 litres water filled reservoir in

$=\frac{1}{60}\times108000$

= 1800 minutes **1**

$=\frac{1800}{60}$ hrs

=30 hrs

Hence, 108000 L water filled reservoir in 30 hrs.

1

Section 'D'

(4 marks each)

23. (a) L.H.S $=a+(b+c)$

$=\frac{2}{3}+\left[\frac{4}{5}+\left(\frac{-5}{6}\right)\right]$

$=\frac{2}{3}+\left[\frac{24-25}{30}\right]$

$=\frac{2}{3}+\left(\frac{-1}{30}\right)$

$=\frac{20-1}{30}=\frac{19}{30}$ **1**

R.H.S. of (i) =(a+b)+c

$=\left(\frac{2}{3}+\frac{4}{5}\right)+\left(\frac{-5}{6}\right)$

$=\left(\frac{10+12}{15}\right)+\left(\frac{-5}{6}\right)$

$= \frac{22}{15} - \frac{5}{6} = \frac{44-25}{30} = \frac{19}{30}$

So, $\frac{2}{3}+\left[\frac{4}{5}+\left(\frac{-5}{2}\right)\right]=\left(\frac{2}{3}+\frac{4}{5}\right)+\left(\frac{-5}{6}\right)$ **1**

Hence Verified

(b) L.H.S $= a\times(b\times c)$

$= \frac{2}{3}\times\left[\frac{4}{5}\times\left(\frac{-5}{6}\right)\right]$

$= \frac{2}{3}\times\left(\frac{-20}{30}\right) = \frac{2}{3}\times\left(\frac{-2}{3}\right)$

$= \frac{2\times(-2)}{3\times3} = \frac{-4}{9}$ **1**

R, H.S. $= (a\times b)\times c$

$= \left(\frac{2}{3}\times\frac{4}{5}\right)\times\left(\frac{-5}{6}\right)$

$= \frac{2\times4}{3\times5}\times\frac{-5}{6}$

$= \frac{8}{15}\times\left(\frac{-5}{6}\right)$

$= \frac{8\times(-5)}{15\times6} = \frac{-40}{90} = \frac{-4}{9}$

So, $\frac{2}{3}\times\left[\frac{4}{5}\times\left(\frac{-5}{6}\right)\right]=\left[\frac{2}{3}\times\frac{4}{5}\right]\times\left(\frac{-5}{6}\right)$ **1**

Hence Verified

24. (a) Let my present age = x years

After 12 years my age = (x + 12) years **1**

4 years ago my age = $(x - 4)$ years

According to question,

$x+12 = 3(x-4)$

or $x+12 = 3x-12$

or $x-3x = -12-12$

or $-2x = -24$

or $x = \frac{-24}{-2}$

or $x = 12$ **1**

Therefore, my present age = 12 years.

(b) Since $2x-3 = 5$

Putting, x = 4 then

LHS $= 2x-3$

$= 2\times4-3 = 8-3 = 5$ **1**

and RHS $= 5$

Hence, LHS = RHS = 5 **[Hence, Verified]** **1**

25. Here, Anju's class raised money for every 60 posters.

Let x be the money.

Money Raised	250	x
Number of posters sold	60	102

Clearly, number of poster will increase, money raised will also increased. This is case of direct proportion

1

$\frac{250}{60} = \frac{x}{102}$

$x = \frac{102 \times 250}{60} = 425$ **1**

Money raised by 102 poster is Rs. 425.

(b) No, class could not raise exactly Rs. 2000.

Let the number of poster Anju's class need to sell be n.

Money Raised (In Rs.)	250	2000
No of posters sold	60	n

$\therefore \quad \frac{250}{60} = \frac{2000}{n}$ **1**

$n = \frac{2000 \times 60}{250} = 480$

So, required number of posters are 480. **1**

26. It is clear from figure that polygon MNOPQR is divided into six parts, out of which four are triangles and two are trapeziums.

Area of polygon MNOPQR = Area of ΔMAN + Area of trapezium ACON + Area of ΔOCP + Area of ΔPDQ + Area of trapezium DBRQ + Area of ARBM ...(i)

Now, area of ΔMAN

$= \frac{1}{2} \times MA \times AN = \frac{1}{2} \times 2 \times 2.5 = 2.5 cm^2$ **1**

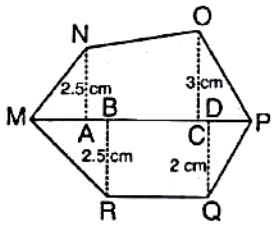
Area of trapezium ACON = $\frac{1}{2}(AN + OC) \times AC$

$= \frac{1}{2}(AN + OC) \times (MC - MA)$

$[\because AC = MC - MA]$

$= \frac{1}{2}(2.5 + 3) \times (6 - 2) = \frac{1}{2} \times 5.5 \times 4$

$= 5.5 \times 2 = 11 cm^2$



Area of $\Delta OCP = \frac{1}{2} \times CP \times OC$

$= \frac{1}{2}(MP - MC) \times OC$

$= \frac{1}{2}(9-6) \times 3 = \frac{1}{2} \times 3 \times 3 \quad [\because CP = MP - MC]$

$= \frac{9}{2} = 4.5 cm^2$ **1**

Area of $\Delta PDQ = \frac{1}{2} \times PD \times DQ$

$= \frac{1}{2} \times (MP - MD) \times DQ \quad [\because PD = MP - MD]$

$= \frac{1}{2} \times (9-7) \times 2 = 2cm^2$ **1**

Area of trapezium $DBRQ = \frac{1}{2} \times (DQ + BR) \times BD$

$= \frac{1}{2} \times (DQ + BR) \times (MD - MB) \quad [\because BD = MD - MB]$

$= \frac{1}{2} \times (2 + 2.5) \times (7 - 4)$

$= \frac{1}{2} \times 4.5 \times 3 = \frac{13.5}{2} = 6.75 cm^2$

Area of $\Delta RBM = \frac{1}{2} \times MB \times BR$

$= \frac{1}{2} \times 4 \times 2.5 = 5cm^2$

On putting all these values in Eq. (i), we get

Area of polygon MNOPQR

$= (2.5 + 11 + 4.5 + 2 + 6.75 + 5)\ cm^2 \quad = 31.75\ cm^2$

Hence, area of polygon MNOPQR is 31.75 cm^2.

1

27. Let shirt material be 3x and trouser material be 2x metres.

The cost of shirt material = $50 \times 3x = 150x$

The selling price at 12% profit = $\frac{100+12}{100} \times 150x$

1

$= \frac{112}{100} \times 150x$

$= 168\ x$ **1**

The cost of trouser. Material $= 90 \times 2x = 180x$

The selling price at 10% profit $= \frac{100+10}{100} \times 180x$

$= \frac{110}{100} \times 180x = 198x$ **1**

According to question, $168x + 198x = 36,600$

or, $366x = 36,600$

or, $x = \frac{36600}{366}$

or, x = 100

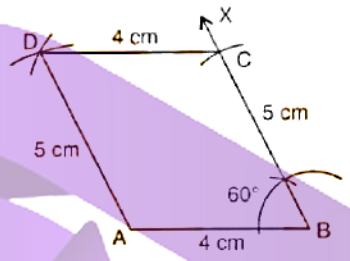
$\therefore$ Trouser material $= 2 \times 100 = 200\ m$

Hence, Hasan bought 200 m trouser material. **1**

28. Opposite sides of a parallelogram (|| gm) are equal.

AB = DC = 4cm

BC = AD = 5cm



2

Steps of Construction

(a) Draw AB = 4 cm. **1**

(b) Draw ray BX such that $\angle ABX = 60°$.

(c) Mark a point C such that BC = 5 cm.

(d) With C and A as centre, draw arcs intersecting at a point D respectively ABCD is the required parallelogram.

1

29. Volume of a cuboid = Length × Breadth × Height

$= (x^2 - 2)\left[(2x+2)(x-1)\right]$

$= (x^2 - 2)[2x^2 - 2x + 2x - 2]$ **1**

$= (x^2 - 2)[2x^2 - 2]$ **1**

$= 2(x^2 - 2)(x^2 - 1)$

$= 2\left[x^4 - x^2 - 2x^2 + 2\right]$ 1

$= 2\left[x^4 - 3x^2 + 2\right]$

$= 2x^4 - 6x^2 + 4$ **1**

30. (a) $\left(2x^3 - 12x^2 + 16x\right) \div (x-2)(x-4)$

$\because\ 2x^3 - 12x^2 + 16x = 2x\left(x^2 - 6x + 8\right)$

$= 2x\ \left(x^2 - 4x - 2x + 8\right)$

$= 2x\left[x(x-4) - 2(x-4)\right]$

$= 2x\left[(x-4)(x-2)\right]$

$= 2x(x-2)(x-4)$

$\therefore\ \frac{2x^2 - 12x^2 + 16x}{(x-2)(x-4)} = \frac{2x(x-2(x-4)}{(x-2)(x-4)} = 2x$

2

(b) $(3x^4 - 1875) \div (3x^2 - 75)$

$\because \quad 3x^4 - 1875 = 3(x^4 - 625)$

$= 3[(x^2)^2 - (25)^2]$

$= 3[(x^2 + 25)(x^2 - 25)]$

$= 3[(x^2 + 25)(x^2 - 5^2)]$

$= 3[(x^2 + 25)(x + 5)(x - 5)]$

and $\quad 3x^2 - 75 = 3(x^2 - 25)$

$= 3\left[(x)^2 - (5)^2\right]$

$= 3(x+5)(x-5)$

$\therefore \quad \dfrac{3x^4 - 1875}{3x^2 - 75}$

$= \dfrac{3(x^2 + 25)(x+5)(x-5)}{3(x+5)(x-5)} = (x^2 + 25)$ **2**