QUESTION BANK SOFTWARE

QB365 MODEL HALF YEARLY QUESTION 2024

9th Standard

Reg.No. :

Maths

Time : 03:00:00 Hrs

Total Marks : 100

SECTION A 14 x 1 = 14

1) Which of the following is correct?

(a) $\{7\} \in \{1,2,3,4,5,6,7,8,9,10\}$ **(b) $7 \in \{1,2,3,4,5,6,7,8,9,10\}$** (c) $7 \notin \{1,2,3,4,5,6,7,8,9,10\}$ (d) $\{7\} \not\subseteq \{1,2,3,4,5,6,7,8,9,10\}$

2) An irrational number between 2 and 2.5 is ________.

(a) $\sqrt{11}$ **(b) $\sqrt{5}$** (c) $\sqrt{2.5}$ (d) $\sqrt{8}$

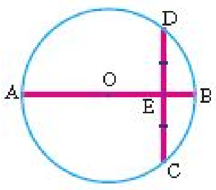
3) The type of the polynomial $4–3x^3$ is ________.

(a) constant polynomial (b) linear polynomial (c) quadratic polynomial **(d) cubic polynomial.**

4) Cubic polynomial may have maximum of ________ linear factors.

(a) 1 (b) 2 **(c) 3** (d) 4

5) In the figure, O is the centre of a circle and diameter AB bisects the chord CD at a point E such that CE = ED = 8 cm and EB = 4 cm. The radius of the circle is ________.



(a) 8cm (b) 4cm (c) 6cm **(d) 10cm**

6) In what ratio does the y-axis divides the line joining the points (−5, 1) and (2, 3) internally ______.

(a) 1 :3 (b) 2 :5 (c) 3 :1 **(d) 5 :2**

7) The mean of the square of first 11 natural numbers is _______.

(a) 26 **(b) 46** (c) 48 (d) 52

8) The value of $\text{cosec}(70^0 + \theta)$ - $\sec(20^0 - \theta)$ + $\tan(65^0 + \theta)$ - $\cot(25^0 - \theta)$ is ________.

(a) 0 (b) 1 (c) 2 (d) 3

9) If the lateral surface area of a cube is 600 cm^2, then the total surface area is _______.

(a) 150 cm^2 (b) 400 cm^2 **(c) 900 cm^2** (d) 1350 cm^2

10) Which of the following is a formula to find the sum of interior angles of a quadrilateral of n-sides?

(a) $\frac{n}{2} \times 180$ (b) $\left(\frac{n+1}{2}\right)180^0$ (c) $\left(\frac{n-1}{2}\right)180^o$ **(d) $(n-2)180^o$**

11) The centre of a circle is (0, 0). One end point of a diameter is (5, -1), then _____________

(a) $\sqrt{24}$ (b) $\sqrt{37}$ **(c) $\sqrt{26}$** (d) $\sqrt{17}$

12) Data available in an unorganized form is called__________data

(a) Grouped data (b) class interval (c) mode **(d) raw data**

13) if $\sin\alpha = \frac{1}{2}$ and α is a cute, then $(3\cos\alpha - 4\cos^3\alpha)$ is equal to

(a) 0 (b) $\frac{1}{2}$ (c) $\frac{1}{6}$ (d) -1

14) The area of a triangle whose sides are a, b and c is ________

(a) $\sqrt{(s-a)(s-b)(s-c)}$sq. units (b) $\sqrt{s(s-a)(s-b)(s-c)}$sq. units (c) $\sqrt{s(s\times a)(s\times b)(s\times c)}$sq. units

(d) $\sqrt{s(s-a)(s-b)(s-c)}$ **sq. units**

SECTION B 10 x 2 = 20

15) If A = {0, 2, 4, 6, 8}, B = {x : x is a prime number and x < 11} and C = {x : x ∈ N and 5 ≤ x < 9} then verify $A\cup(B\cap C)=(A\cup B)\cap(A\cup C)$.

Answer : Given A = {0, 2, 4,6, 8} , B = {2, 3, 5, 7} and C = {5, 6, 7, 8}

First, we find $B\cap C$ = {5, 7} ,$A\cup(B\cap C)$ = {0, 2, 4, 5, 6, 7, 8} .... (1)

Next, $A\cup B$ = {0,2,3,4,5,6,7, 8}, $A\cup C$ = {0, 2, 4, 5, 6, 7, 8}

Then, $(A\cup B)\cap(A\cup C)$ = {0, 2, 4, 5, 6, 7, 8} ....(2)

From (1) and (2), it is verified that $(A\cup(B\cap C)=(A\cup B)\cap(A\cup C)$.

16) Write the following in the form of 4^n:

16

Answer : $16 = 4^2$

17) Check whether p(x) is a multiple of g(x) or not

$p(x) = x^3 - 5x^2 + 4x - 3$; g(x) = x – 2

Answer : $p(x) = x^3 - 5x^2 + 4x - 3$

g(x) = x - 2

$p(x) = x^3 - 5x^2 + 4x - 3$

$p(2) = (2)^3 - 5(2)^2 + 4(2) - 3$

= 8 - 5(4)+8 - 3

= 8 - 20 + g - 3

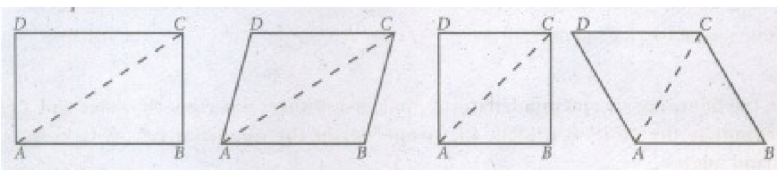
= 16 - 23

= -7

∴ P(x) is not a multiple of g(x)

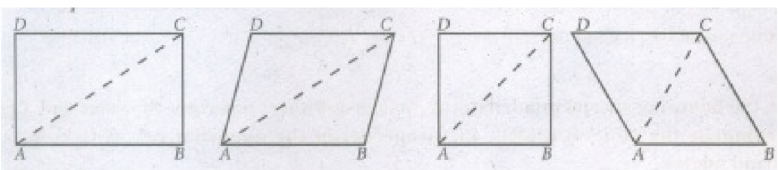
18) Step -1

Cut out four different quadrilaterals from coloured glazed papers.



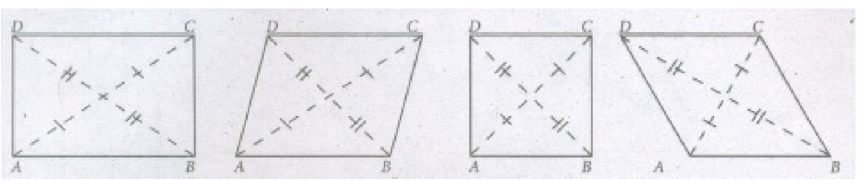
Step - 2

Fold the quadrilaterals along their respective diagonals. Press to make creases. Here, dotted line represent the creases.



Step -3

Fold the quadrilaterals along both of their diagonals. Press to make creases.



We observe that two imposed triangles are congruent to each other. Measure the lengths of portions of diagonals and angles between the diagonals.

Also do the same for the quadrilaterals such as Trapezium, Isosceles Trapezium and Kite. From the above activity, measure the lengths of diagonals and angles between the diagonals and record them in the table below:

S.No	Name of the quadrilateral	Length along diagonals						Measure of angles			
		AC	BD	OA	OB	OC	OD	∠AOB	∠BOC	∠COD	∠DOA
1.	Trapezium										
2.	Isosceles Trapezium										
3.	Parallelogram										
4.	Rectangle										
5.	Rhombus										
6.	Square										
7.	Kite										

Answer :

19) In which quadrant does the following points lie? (3,–8)

Answer : The x- coordinate is positive and y – coordinate is negative. So, Point(3,–8) lies in the IV quadrant.

20) In a research laboratory scientists treated 6 mice with lung cancer using medicine. Ten days, they measured the volume of the tumor of the tumor in each mouse given the results in the table

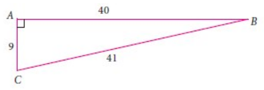
Mouse marking	1	2	3	4	5	6
Tumor Volume(mm)^3	145	148	142	141	139	140

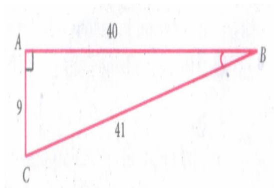
Find the mean

Answer : $\bar{x} = \frac{\Sigma x}{n} = \frac{145+148+142+141+139+140}{6} = \frac{855}{6}$

x = 142.5 mm^2

21) From the given figure, find all the trigonometric ratios of angle B.



Answer : 

sin B = $\frac{9}{41}$;

cos B = $\frac{40}{41}$;

tan B = $\frac{9}{40}$;

cosec B = $\frac{1}{sinB}$ = $\frac{41}{9}$;

sec B = $\frac{1}{cotB}$ = $\frac{41}{40}$;

cot B = $\frac{1}{tanB}$ = $\frac{40}{9}$

22) If the total surface area of a cube is 2400 cm^2 then, find its lateral surface area.

Answer : 6a^2 = 2400 cm^2

⇒ a^2= $\frac{2400}{6}$

∴ 4a^2 = $\frac{4\times2400}{6}$

= 1600 cm^2.

23) What is the probability of drawing a King or a Queen or a Jack from a deck of cards?

Answer : Number of cards n(S) = 52

No. of King cards n(A) = 4

No. of Queen cards n(B) = 4

No. of Jack cards n(C) = 4

Probability of drawing a King card

$\frac{n(A)}{n(S)} = \frac{4}{52}$

Probability of drawing a Queen card

= $\frac{n(B)}{n(S)} = \frac{4}{52}$

Probability of drawing a Jack card

= $\frac{n(C)}{n(S)} = \frac{4}{52}$

∴ The Probability of drawing a King or a Queen or a Jack from a deck of cards

= p(A) + P(B)+ P(C) = $\frac{4}{52} + \frac{4}{52} + \frac{4}{52} = \frac{4+4+4}{52} = \frac{12}{52} = \frac{3}{13}$.

24) Find the mode of the given data: 3.1, 3.2, 3.3, 2.1,1.3, 3.3, 3.1

Answer : 3.1, 3.2, 3.3, 2.1,1.3, 3.3, 3.1

In this given data 3.1, 3.3 occurs twice

∴ mode = 3.1 and 3.3(bimodal)

SECTION C 10 x 5 = 50

25) Let A and B be two overlapping sets and the universal set be U. Draw appropriate Venn diagram for each of the following,

(i) AUB

(ii) A∩B

(iii) $(A\cap B)'$

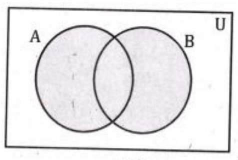
(iv) $(B-A)'$

(v) $A'\cup B'$

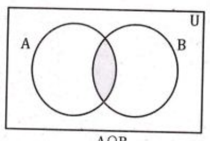
(vi) $A'\cap B'$

(vii) What do you observe from the Venn diagram (iii) and (v)?

Answer : (i) AUB

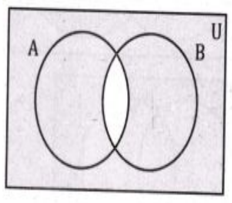


(ii) A∩B



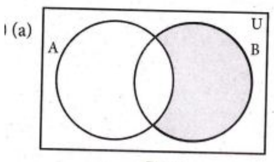
A∩B

(iii) (A∩B)′

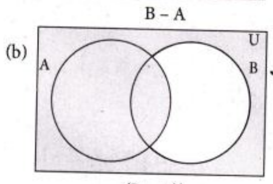


(A∩B)′

(iv) (B–A)'

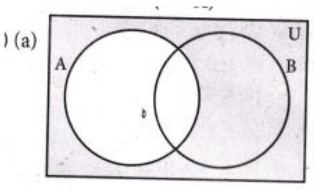


B – A

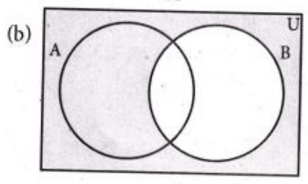


(B – A)′

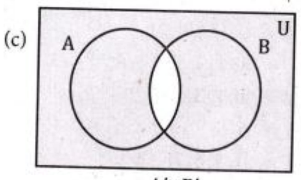
(v) A′UB′



A′

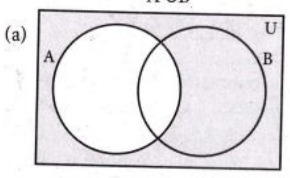


B′

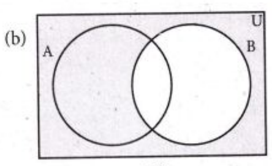


A′∪B′

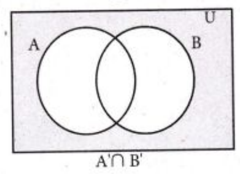
(vi) A′∩B′



A′



B′



A′∩B′

(vii) From the venn diagram (iii) and (v), We have

$(A \cap B)' = A' \cup B'$

Now $\mathrm{B} \cap \mathrm{C} = \left\{\frac{1}{4}, 2, \frac{5}{2}\right\}$

$A \cap (B \cap C) = \left\{\frac{1}{4}, 2\right\}$............(1)

Then $A \cap B = \left\{0, \frac{1}{4}, \frac{3}{4}, 2\right\}$

$(A \cap B) \cap C = \left\{\frac{1}{4}, 2\right\}$.............(2)

From (1) and (2), it is verified that

$(A \cap B) \cap C = A \cap (B \cap C)$

26) Find the 5^{th} root of 243.

Answer : $\sqrt[5]{243} = 243^{\frac{1}{5}} = (3^5)^{\frac{1}{5}} = 3^{5\times\frac{1}{5}} = 3$

27) Draw the graph for the following

(i) y = 3x - 1

(ii) $y = \left(\frac{2}{3}\right)x + 3$

Answer : (i) Let us prepare a table to find the ordered pairs of points for the line y = 3x −1.

We shall assume any value for x, for our convenience let us take −1, 0 and 1.

When x = −1, y = 3(−1)−1 = −4

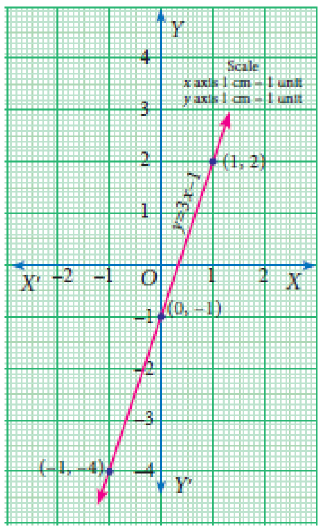
When x = 0 , y = 3(0)−1 = −1

When x = 1, y = 3(1)−1 = 2

x	-1	0	1
y	-4	-1	2

The points (x,y) to be plotted :

(−1, −4), (0, −1) and (1, 2).



(ii) Let us prepare a table to find the ordered pairs of points for the line y = $\left(\frac{2}{3}\right)x + 3$

Let us assume −3, 0, 3 as x values.

(why?)

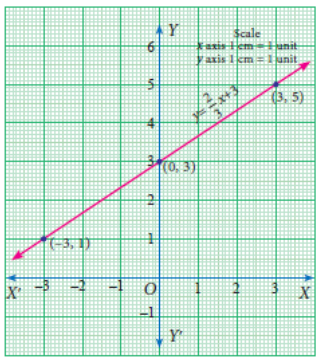
When x = -3, $y = \frac{2}{3}(-3) + 3 = 1$

When x = 0, $y = \frac{2}{3}(0) + 3 = 3$

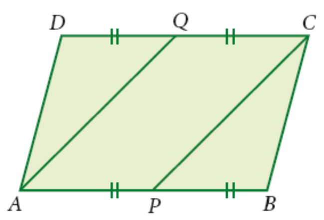
When x =3, $y = \frac{2}{3}(3) + 3 = 5$

x	-3	0	3
y	1	3	5

The points (x, y) to be plotted: (-3, 1), (0, 3) and (3, 5).



28) In the Figure ABCD is a parallelogram, P and Q are the mid-points of sides AB and DC respectively. Show that APCQ is a parallelogram.



Answer : Since P and Q are the mid points of

AB and DC respectively

Therefore $AP = \frac{1}{2}AB$ and

$QC = \frac{1}{2}DC$ .... (1)

But AB = DC (Opposite sides of a parallelogram are equal)

$\Rightarrow \frac{1}{2}AB = \frac{1}{2}DC$

⇒ AP = QC .... (2)

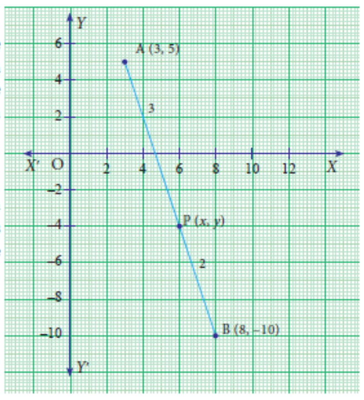
Also, AB || DC

⇒ AP || QC .... (3) [∵ ABCD is a parallelogram]

Thus, in quadrilateral APCQ we have AP= QC and AP || QC [from (2) and (3)]

Hence, quadrilateral APCQ is a parallelogram.

29) Find the coordinates of the point which divides the line segment joining the points (3, 5) and (8, −10) internally in the ratio 3:2.



Answer : Let A(3,5), B(8,−10) be the given points and let the point P(x, y) divides the line segment AB internally in the ratio 3:2.

By section formula,

P(x, y) =P$\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$

Here x_1 = 3, y_1 = 5, x_2 = 8, y_2 = −10 and m = 3, n = 2

Therefore P(x, y) = P$\left(\frac{3(8)+2(3)}{3+2}, \frac{3(-10)+2(5)}{3+2}\right)$ = P(6, -4)

30) The Median of the following data is 24. Find the value of x.

CLASS INTERVAL (CI)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
FREQUENCY (F)	6	24	x	16	9

Answer :

CLASS INTERVAL (CI)	FREQUENCY (F)	CUMULATIVE FREQUENCY (CF)
0-10	6	6
10-20	24	30
20-30	x	30 + x
30-40	16	46 + x
40-50	9	55 + x
	N = 55 + x	

Since the median is 24 and median class is 20 – 30

l = 20 N = 55 + x, m = 30, c = 10, f = x

Median = $l + \frac{\left(\frac{N}{2}-m\right)}{f} \times c$

$24 = 20 + \frac{\left(\frac{55+x}{2}-3\right)}{x} \times 10$

$4 = \frac{5x-25}{x}$ (after simplification)

4x = 5x – 25

5x – 4x = 25

x = 25

31) Find the value of the following:

$\frac{cot\theta}{tan(90^\circ-\theta)} + \frac{cos(90^\circ-\theta)tan\theta sec(90^\circ-\theta)}{sin(90^\circ-\theta)cosec(90^\circ-\theta)}$

Answer : $\frac{cot\theta}{tan(90^\circ-\theta)} + \frac{cos(90^\circ-\theta)tan\theta sec(90^\circ-\theta)}{sin(90^\circ-\theta)cosec(90^\circ-\theta)}$

$= \frac{\cot\theta}{\cot\theta} + \frac{\cos(90-\theta).\cancel{\tan\theta}.\text{cosec}\,\theta}{\cos\theta.\cancel{\tan\theta}.\sec\theta}$

$= 1 + \frac{\sin\theta}{\cos\theta}.\left(\frac{\frac{1}{\sin\theta}}{\frac{1}{\cos\theta}}\right) = 1 + \frac{\cancel{\sin\theta}}{\cancel{\cos\theta}}.\frac{1}{\cancel{\sin\theta}} \times \frac{\cancel{\cos\theta}}{1} = 2$

32) A farmer has a field in the shape of a rhombus. The perimeter of the field is 400 m and one of its diagonal is 120 m. He wants to divide the field into two equal parts to grow two different types of vegetables. Find the area of the field.

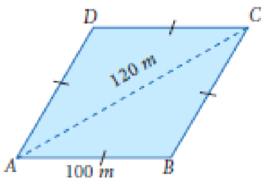
Answer : Let ABCD be the rhombus.

Its perimeter = 4 × side = 400 m

Therefore, each side of the rhombus = 100 m

Given the length of the diagonal AC = 120 m

In $\triangle$ABC, let a =100 m, b =100 m, c = 120 m



s = $\frac{a+b+c}{2} = \frac{100+100+120}{2}$ = 160 m

Area of $\triangle$ABC = $\sqrt{160(160-100)(160-100)(160-120)}$

= $\sqrt{160 \times 60 \times 60 \times 40}$

= $\sqrt{40 \times 2 \times \times 2 \times 60 \times 60 \times 40}$

= 40 × 2 × 60 = 4800 m^2

Therefore, Area of the field ABCD = 2 × Area of $\triangle$ABC = 2 × 4800 = 9600 m^2

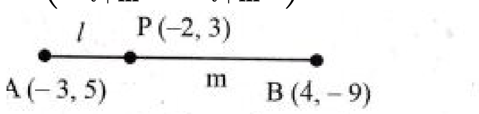
33) In what ratio does the point P (-2, 3) divide the line segment joining the points A(-3, 5), B (4, -9) internally?

Answer : Given points are A (-3, 5) and B (4, -9)

Let P(-2, 3) divide AB internally in the ratio l : m

By the section formula

$\mathrm{P}\left(\frac{l x_2+\mathrm{m} x_1}{l+\mathrm{m}}, \frac{l y_2+\mathrm{my}}{l+\mathrm{m}}\right)=\mathrm{P}(-2,3)$



$x_1 = -3;\ y_1 = 5;\ x_2 = 4;\ y_2 = -9$

$\left(\frac{l(4)+\mathrm{m}(-3)}{l+\mathrm{m}}, \frac{l(-9)+\mathrm{m}(5)}{l+\mathrm{m}}\right)=(-2,3)$

Equating the x coordinates we get

$\frac{4 l-3 \mathrm{~m}}{l+\mathrm{m}}=-2$

6 l = m

$\frac{l}{\mathrm{~m}}=\frac{1}{6}$

l : m =1: 6

Hence P divides AB internally in the ratio 1 : 6

34) How many hollow blocks of sixe 30 cm $\times$ 15 cm $\times$20 cm are needed to construct a wall 60 m in length, 0.3 m in breadth and 2 m in height.

Answer : Dimensions of hollow blocks are 30 cm, 15 cm, 20 cm = 0.30m, 0.15 m, 0.20 m

Dimensions of the wall are 60 m, 0.3 m, 2 m

No of hollow blocks needed to constant a wall

$=\frac{\text{Volume of wall}}{\text{Volume of blocks}}$

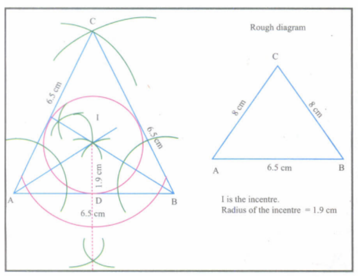
$=\frac{60 \times 0.30 \times 2}{0.30 \times 0.15 \times 0.20}$

$=\frac{120}{0.03}=4000$

SECTION D 2 x 8 = 16

35) Draw an equilateral triangle of side 6.5 cm and locate its incentre. Also draw the incircle.

Answer :



Construction :

Step 1: Draw $\triangle$ABC with AB = BC = CA = 6.5 cm

Step 2: Construct angle bisectors of any two angles (A and B) and let them meet at I. I is the incentre of $\triangle$ABC.

Step 3: Draw perpendicular from I to any one of the side (AB) to meet AB at D.

Step 4: With I as centre, ID as radius draw the circle. This circle touches all the sides of triangle internally.

Step 5: Measure in radius. In radius = 1.9 cm.

36) Find the product of

(i) (x + 2)(x+5)(x + 7)

(ii) (a - 3)(a - 5)(a - 7)

(iii) (2a - 5)(2a + 5)(2 - 3)

Answer : (x + 2)(x + 5) (x + 7)

$= x^3 + (2 + 5 + 7)x^2 + (2)(5) + (5)(7) \ + (7)(2)]x + 2(5)(7)$

$= x^3 + 14x^2 + (10 + 35 + 14)x + 70$

$= x^3 + 14x^2 + 59x + 70$

(ii) (a - 3)(a - 5)(a - 7)

$= [a + (-3)][a + (-5)][a + (-7)]$

$= a^3 + (-3 - 5 - 7)a^2 + [(-3)(-5) + (-5)(-7) + (-7)(-3)a + (-3)](-5)(-7)$

$= a^3 - 15a^2 + (15 + 35 + 21)a - 105$

$= a^3 - 15a^2 + 71a - 105$

(iii) (2a - 5)(2a + 5)(2 - 3)

$= [2a + (-5)](2a + 5)[2a + (-3)]$

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

$= 8a^3 + (-3)4a^2 + (-25 - 15 + 15)2a + 75$

$= 8a^3 - 12a^2 - 50a + 75$