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# कक्षा - 11

## गणित

अध्याय – 2

## संबंध एवं फलन

भाग – 7

प्रश्नावली 2.3

हर्ष गोयल

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# प्रश्नावली 2.3

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1. निम्नलिखित संबंधों में कौन से फलन हैं? कारण का उल्लेख कीजिए। यदि संबंध एक फलन है, तो उसका परिसर निर्धारित कीजिए:

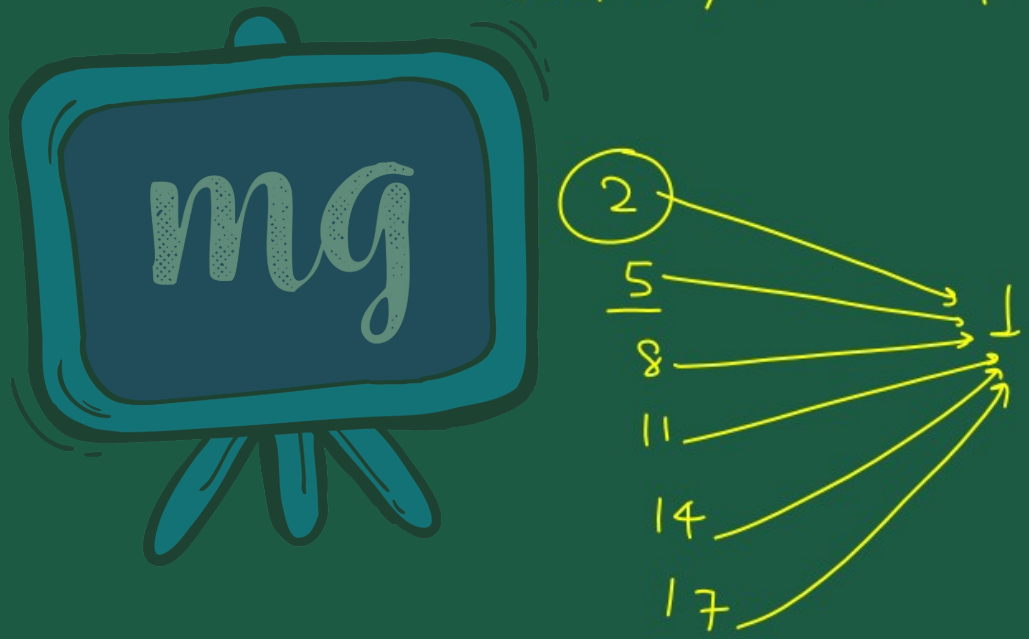
   (i) {(2,1), (5,1), (8,1), (11,1), (14,1), (17,1)}

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(2,1), (5,1), (8,1)

(11,1), (14,1), (17,1)



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यह संबंध फलन है।

क्यों कि 2, 5, 8, 11, 14, 17 सभी का प्रतिबिंब 1 है।

(अर्थात् केवल और केवल एक प्रतिबिंब बन रहा है)




परिसर = {1}

प्रांत = {2, 5, 8, 11, 14, 17}

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(ii) {(2, 1), (4, 2), (6, 3), (8,4),
(10, 5), (12, 6), (14, 7)}




$2 \longrightarrow 1$

$4 \longrightarrow 2$

$6 \longrightarrow 3$

$8 \longrightarrow 4$

$10 \longrightarrow 5$

$12 \longrightarrow 6$

$14 \longrightarrow 7$

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यह संबंध फलन है
क्योंकि 2, 4, 6, 8,
10, 12, 14 का
केवल एक प्रतिबिंब
बन रहा है।




परिसर = {1, 2, 3, 4,
5, 6, 7}

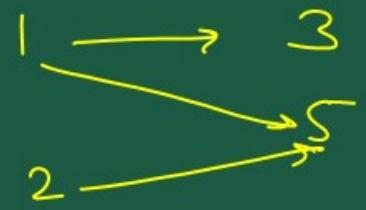
प्रांत = {2, 4, 6, 8, 10,
12, 14}

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(iii) $\{(1, 3), (1, 5), (2, 5)\}$




यह फलन नहीं है

क्यों कि 1 के दो प्रतिबिंब

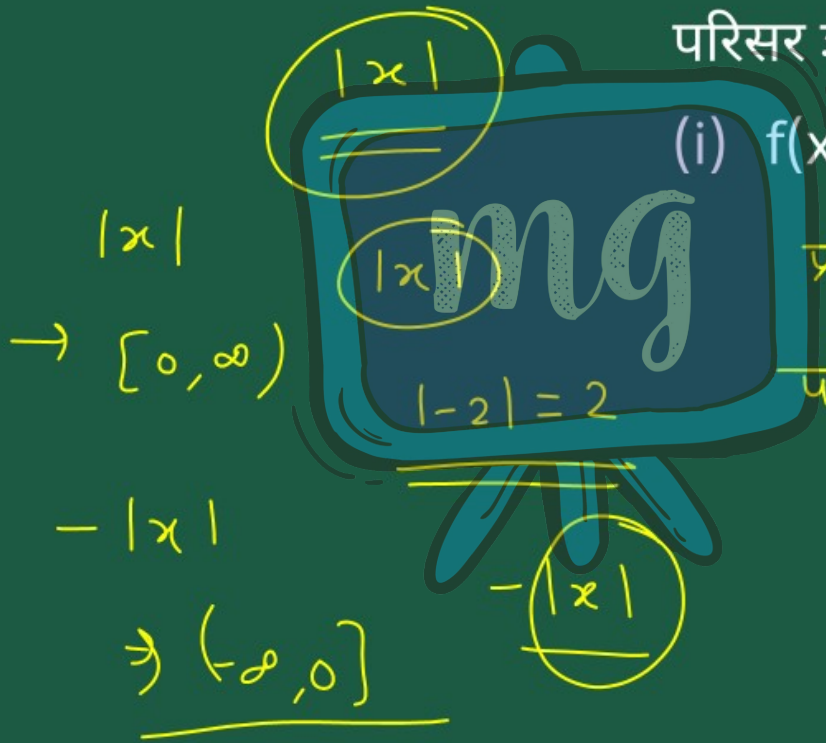
3 व 5 हैं।

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2. निम्नलिखित वास्तविक फलनों के प्रांत तथा परिसर ज्ञात कीजिए:

(i) $f(x) = -|x|$




$|x|$

$\rightarrow [0, \infty)$

$-|x|$

$\Rightarrow (-\infty, 0]$

प्रांत $= R$

परिसर $= (-\infty, 0]$

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(ii) $f(x) = \sqrt{9 - x^2}$

$\sqrt{-ve}$ X

$x = 4$

$\sqrt{9 - (4)^2}$

$\sqrt{9 - 16}$

$\sqrt{-7}$

X

( X )

$\therefore \sqrt{9 - x^2}$

$9 - x^2 \geq 0$

$9 \geq x^2$

$x^2 \leq 9$

$-3 \leq x \leq 3$

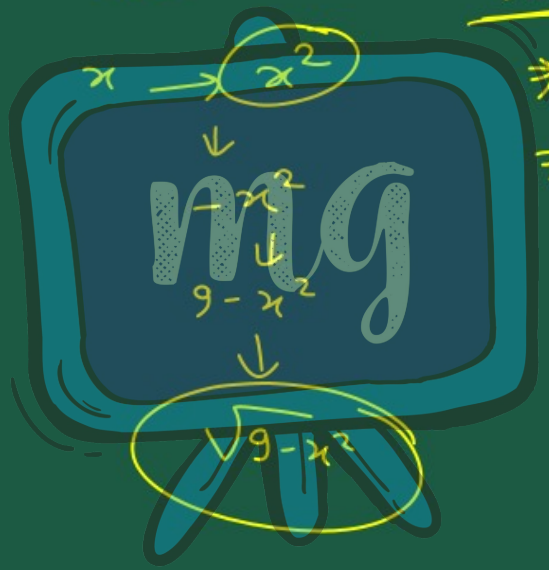
परास $= [-3, 3]$

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$f(x) = \sqrt{9-x^2}$

$\sqrt{9-x^2}$




प्रांत

$-3 \le x \le 3$

$\Rightarrow \quad 0 \le x^2 \le 9$

$\Rightarrow \quad 0 \ge -x^2 \ge -9$

$\Rightarrow \quad -9 \le -x^2 \le 0$

$\Rightarrow \quad -9+9 \le 9-x^2 \le 0+9$

$\Rightarrow \quad 0 \le 9-x^2 \le 9$

$\Rightarrow \quad 0 \le \sqrt{9-x^2} \le 3$

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$$0 \leq \sqrt{9-x^2} \leq 3$$

$$0 \leq f(x) \leq 3$$

परिसर $= [0, 3]$

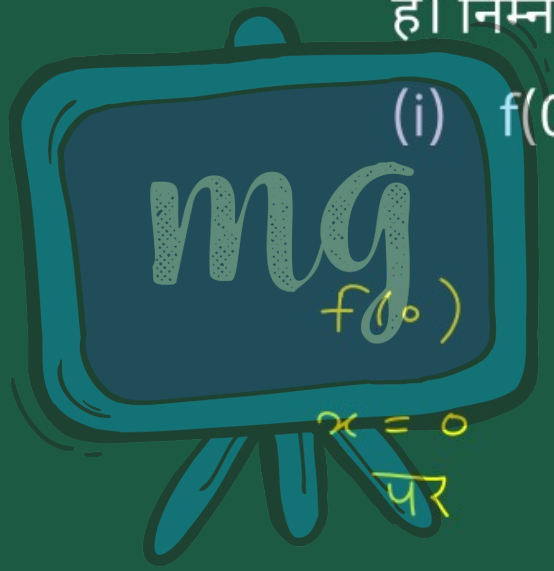


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3. एक फलन f(x) = 2x – 5 द्वारा परिभाषित है। निम्नलिखित के मान लिखिए:

(i) f(0)




$f(x) = 2x - 5$

$f(0) = 2(0) - 5$

$= 0 - 5$

$f(0) = -5$

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(ii) f(7)




$f(x) = 2x - 5$

$f(7)$

$x = 7$ पर

$f(7) = 2(7) - 5$

$= 14 - 5$

$f(7) = 9$

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## (iii) f(–3)




$f(x) = 2x - 5$

$f(-3)$

$x = -3$ पर

$f(-3) = 2(-3) - 5$

$= -6 - 5$

$f(-3) = -11$

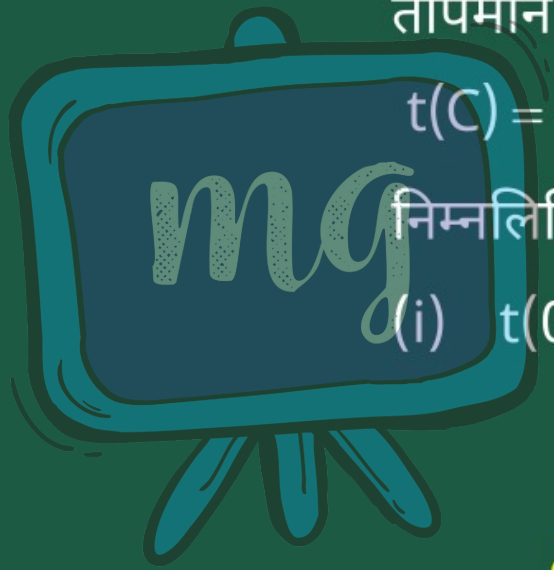
Ans

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4. फलन 't' सेल्सियस तापमान का फारेनहाइट तापमान में प्रतिचित्रण करता है, जो $t(C) = \frac{9C}{5} + 32$ द्वारा परिभाषित हैं निम्नलिखित को ज्ञात कीजिए:

(i) $t(0)$



$t(c) = \frac{9c}{5} + 32$

$c = 0$ पर फलन का मान

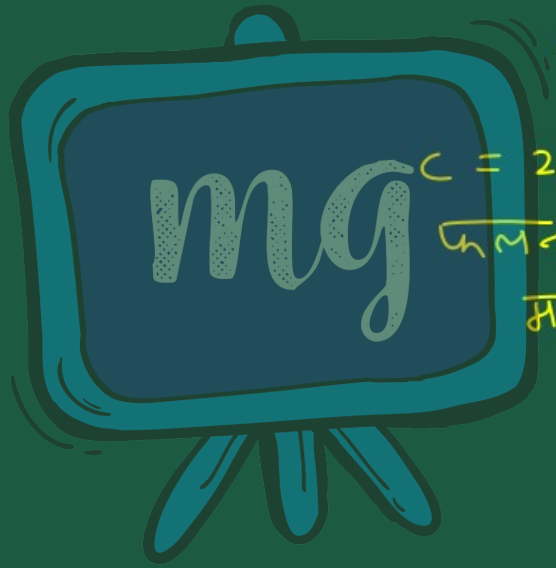
$t(0) = \frac{9(0)}{5} + 32$

$t(0) = 32$

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(ii) t(28)




$t(c) = \frac{9c}{5} + 32$

$c = 28$ पर फलन का मान

$= \frac{9 \times 28}{5} + 32$

$= \frac{252}{5} + 32$

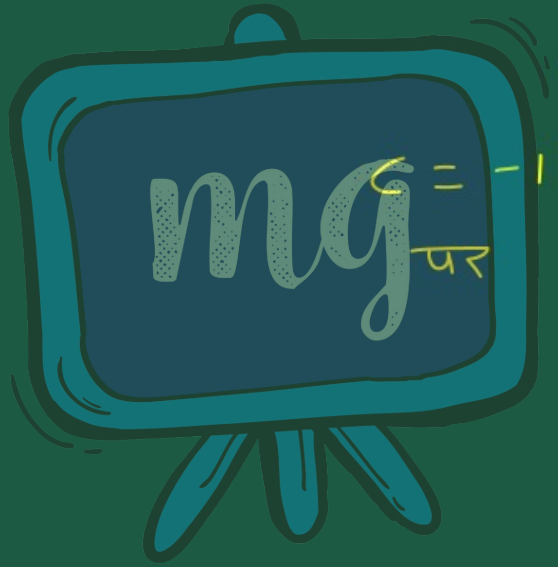
$= 50.4 + 32$

$= 82.4$ A

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(iii) t(– 10)




$t(c) = \frac{9c}{5} + 32$

c = –10 पर

$t(-10) = \frac{9 \times -10}{5} + 32$

$= 9 \times -2 + 32$

$= -18 + 32$

$= 14$

Ans

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## (iv) C का मान, जब t(C) = 212




$$t(c) = \frac{9c}{5} + 32$$

$$\therefore t(c) = 212$$

$$212 = \frac{9c}{5} + 32$$

$$\Rightarrow \frac{9c}{5} = 212 - 32$$

$$\Rightarrow \frac{9c}{5} = 180$$

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$$\frac{9C}{5} = 180$$

$$9C = 180 \times 5$$

$$C = \frac{\overset{20}{\cancel{180}} \times 5}{\cancel{9}}$$

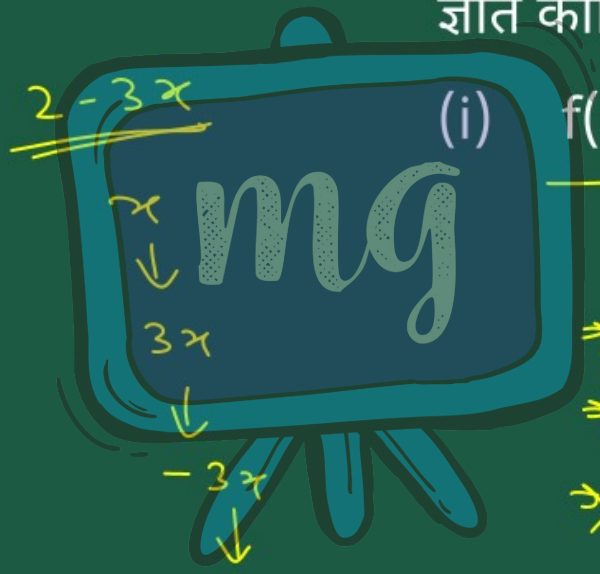
$$C = 100$$

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5. निम्नलिखित में से प्रत्येक फलन का परिसर ज्ञात कीजिए:

(i) $f(x) = 2 - 3x, x \in R, x > 0.$




$x > 0$ , $x \in R$

$3x > 0$

$-3x < 0$

$2 - 3x < 0 + 2$ ( 2 जोड़ने पर)

$2 - 3x < 2$

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$2 - 3x < 2$

$\rightarrow f(x) < 2$

परिसर $= (-\infty, 2)$

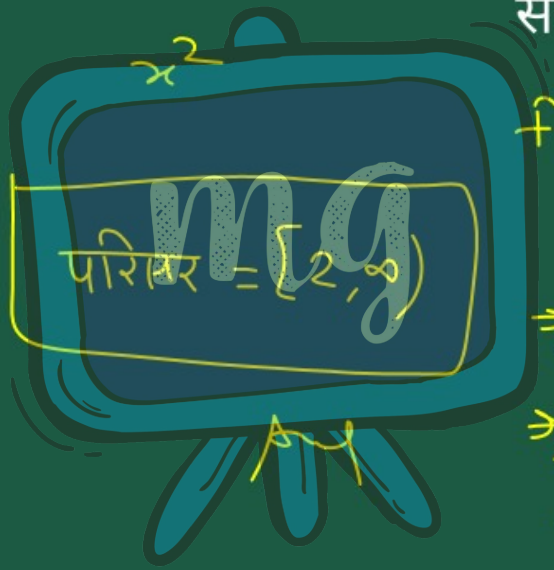


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$x \to x^2 \to x^2+2$

(ii) $f(x) = x^2 + 2$, x एक वास्तविक संख्या है।




$f(x) = x^2 + 2$

$x \in R$

$\Rightarrow x^2 \geq 0$ (2 जोड़ने पर)

$\Rightarrow x^2 + 2 \geq 0 + 2$

$\Rightarrow x^2 + 2 \geq 2$

$\Rightarrow f(x) \geq 2$

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(iii) $f(x) = x$, x एक वास्तविक संख्या है।

