### EXERCISE # 1

#### **A.** Very Short Answer Type Question

- Q.1 Which of the following are quadratic polynomials (i)  $5x^2 - 8x + 12$  (ii)  $3 + 4x - 7x^2$ (iii)  $8x^2 - 15$  (iv) 8x - 15(v)  $8x^3 - 3x$  (vi)  $x^2 - \sqrt{5}x + 2\sqrt{3}$ (vii)  $\sqrt{3}x^2 - 10x - 5\sqrt{3}$ (viii)  $\sqrt{7} - \sqrt{5}x - \sqrt{3}x^3$ (ix)  $\sqrt{15}x^2 - \sqrt{5}x + 7$
- Q.2 Find the value of each given polynomial at the given value of its variable :
  - (i)  $5x^2 7x + 2$  at x = 3
  - (ii)  $x^2 + 15x 4$  at x = -1
  - (iii)  $2y^2 y + 2$  at y = -2
  - (iv)  $3y + 8 2y^2$  at y = -3
  - (v)  $\sqrt{2} x^2 + 3x + 1$  at  $x = \sqrt{2}$
  - (vi)  $x^3 3x^2 + 5x + 2$  at x = -4

(vii) 
$$5\sqrt{2} x^3 + 2x^2 - \sqrt{2} x + 1$$
 at  $x = 2\sqrt{2}$ 

Q.3 Find the value of constant 'm' if :

- (i) x = -2 is a zero of quadratic polynomial  $4x^2 - 3mx + 5$ .
- (ii) y = -5 is a zero of quadratic polynomial 7+4 (m + 2) y - y<sup>2</sup>
- **Q.4** Which of the following are quadratic equations:

(i) 
$$x^2 - 9x + 5 = 0$$
 (ii)  $x^2 - \frac{3}{x} = 2$ 

**Q.5** Which of the following are quadratic equations:

(i) 
$$x - \frac{3}{x} = 2x^2$$
 (ii)  $15x^2 + 27x - 33 = 0$ 

**Q.6** Which of the following are quadratic equations:

(i) 
$$\sqrt{3} x^2 + 8x = 3\sqrt{2}$$

(ii) 
$$\frac{7}{8}x^2 - \frac{3}{5}x + \frac{5}{7} = 0$$

**Q.7** Determine whether  $x = -\frac{2}{\sqrt{3}}$  and  $x = -3\sqrt{3}$ 

are solutions of given equation or not :

$$\sqrt{3} x^2 + 11x + 6\sqrt{3} = 0$$

**Q.8** Determine if x = 5 is a root of equation given below or not :

$$\sqrt{2x^2 + 4x - 5} - \sqrt{x^2 - 4x + 4} = \sqrt{1 - 12x + 3x^2}$$

- Q.9 In each case given below; find the value of 'm' for which the given value of the variable is a solution of the equation : (i)  $(2m + 1) x^2 + 2x - 3 = 0; x = 2$ 
  - (ii)  $3x^2 + 2mx 3 = 0; 2x 1 = 0$
  - (iii)  $x^2 + 2ax m = 0; x + a = 0$
- **Q.10** Determine whether  $x = \frac{1}{2}$  and  $x = \frac{3}{2}$  are solutions of the equation  $2x^2 5x + 3 = 0$  or not.

# Solve each of the following quadratic equations (Q.11 to Q. 27)

Q.11  $x^{2} + 5x + 6 = 0$ Q.12  $x^{2} - 8x - 33 = 0$ Q.13  $x^{2} + 4x - 32 = 0$ Q.14  $x^{2} + 5x - 6 = 0$ Q.15  $x^{2} - 5x - 6 = 0$ Q.16  $x^{2} - 5x + 6 = 0$ Q.17  $5x^{2} - 2ax - 3a^{2} = 0$ Q.18  $x^{2} + 8x = 0$ Q.19  $3x^{2} + 2ax - a^{2} = 0$ 

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- $4x^2 25x 21 = 0$ Q.20
- $10x^2 7x 12 = 0$ Q.21
- $8x^2 2x 3 = 0$ **O.22**
- $3x^2 7x 6 = 0$ 0.23
- Q.24 x(4x-7) = 0
- Q.25 x(x + 1) + (x + 2) (x + 3) = 26
- Q.26 x(x-1) + (x-2)(x-3) = 42
- **O.27**  $4x^2 = 25$
- Q.28 Without solving, examine the nature of roots of the equations :

(i)  $3x^2 + 2x - 1 = 0$  (ii)  $4x^2 + 3x - 1 = 0$ (iii)  $6x^2 - 5x - 6 = 0$  (iv)  $x^2 - 6x + 9 = 0$ (v)  $2x^2 - 5x + 5 = 0$  (vi)  $3x^2 + 7x + 3 = 0$ (vii)  $4x^2 - 4x + 1 = 0$  (viii)  $5x^2 - 8x + 2 = 0$ (ix)  $x^2 + px - q^2 = 0$ 

Q.29 Find the discriminant of the following quadratic equations :

> (i)  $x^2 - 3x + 1 = 0$  (ii)  $4x^2 + 3x - 2 = 0$ (iii)  $x^2 - x + 1 = 0$  (iv)  $9x^2 - px + 2 = 0$ (v)  $ax^2 - 3x - 5 = 0$  (vi)  $4x^2 - 5x + c = 0$ (vii)  $\sqrt{2} x^2 + 5\sqrt{3} x - 2\sqrt{2} = 0$ (viii)  $3\sqrt{5} x^2 - 8x + 2\sqrt{5} = 0$

Q.30 Find the sum and the product of the roots of the following equations :

> (i)  $2x^2 - 7x + 4 = 0$ (ii)  $3x^2 + 4\sqrt{2}x + 9 = 0$ (iii)  $2x^2 + 5\sqrt{3}x - 3 = 0$ (iv)  $x^2 - 2\sqrt{5} x - 15 = 0$ (v)  $5x^2 - 10x + 3\sqrt{5} = 0$

#### **Short Answer Type Question** R

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Find the roots (if they exist) of the following quadratic equations by the method of completing the square : (Q.31 to Q.37)  $x^2 - 2\sqrt{5}x + 1 = 0$ 

Q.31 
$$x^2 - 2\sqrt{5} x + 1 = 0$$
  
Q.32  $4x^2 + x - 5 = 0$   
Q.33  $9x^2 + x + 15 = 0$   
Q.34  $x^2 - 5x + 7 = 0$   
Q.35  $x^2 + 4x - 9 = 0$   
Q.36  $2x^2 - 5x + 3 = 0$   
Q.37  $5x^2 - 6x - 2 = 0$ 

Solve each of the following equations by using quadratic formula (Q.38 to Q.45)

- $x^2 2\sqrt{2}x 6 = 0$ Q.38 **0.39**  $\sqrt{6} x^2 - 4x - 2\sqrt{6} = 0$  $\sqrt{3} x^2 + 11 x + 6 \sqrt{3} = 0$ Q.40  $16x^2 - 1 = 0$ Q.41 **0.42**  $5x^2 - x - 4 = 0$ Q.43  $4x^2 - 7x + 3 = 0$  $x^2 = 3x$ Q.44  $3x^2 - 5x = 0$ Q.45
- In the following, determine the set of values Q.46 of p for which the quadratic equation has real roots :
  - (i)  $px^2 + 4x + 1 = 0$  (ii)  $2x^2 + 3x + p = 0$ (iii)  $2x^2 + px + 3 = 0$  (iv)  $3x^2 - 2px - 5 = 0$ (v)  $2px^2 - 6x - 3 = 0$
- 0.47 In the following, determine whether the given quadratic equations have real roots and if so find the roots :

(i) 
$$x^2 + 6x + 6 = 0$$

(ii)  $x^2 - 3x + 4 = 0$ 

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- (iii)  $4x^2 + x 3 = 0$ (iv)  $9x^2 + 30x + 25 = 0$ (v)  $4x^2 - 12x + 9 = 0$ (vi)  $3x^2 - 3x + 1 = 0$ (vii)  $3x^2 - 3x - 1 = 0$ (viii)  $4x^2 + 5\sqrt{3}x + 3 = 0$ (ix)  $5x^2 - 2\sqrt{5}x - 3 = 0$
- **Q.48** Find the quadratic equation whose roots are :
  - (i) 5 and -5 (ii) 8 and 3(iii) -8 and -3 (iv) -8 and 3(v)  $\sqrt{3} \text{ and } 5\sqrt{3}$  (vi)  $2\sqrt{2} \text{ and } -3\sqrt{2}$ (vii)  $-3\sqrt{5} \text{ and } -4\sqrt{5}$ (viii)  $1 + \sqrt{2} \text{ and } 1 - \sqrt{2}$ (ix)  $4 - \sqrt{5} \text{ and } 4 + \sqrt{5}$ (x)  $7 + \sqrt{7} \text{ and } 7 - \sqrt{7}$ (xi)  $\frac{3 + \sqrt{2}}{3} \text{ and } \frac{3 - \sqrt{2}}{3}$ (xii)  $\frac{4 - \sqrt{5}}{2} \text{ and } \frac{4 + \sqrt{5}}{2}$

#### **C.** Long Answer Type Question

- Q.49 Find the value of 'm' so that the roots of the equation :  $(4 - m) x^2 + (2m + 4) x + (8m + 1) = 0$  may be equal.
- Q.50 For the quadratic equation  $ax^2 + 7x + c = 0$ ; the sum of roots is -1 and the product of roots is 1; find the values of 'a' and 'c'.

- Q.51 For the quadratic equation  $ax^2 3x b = 0$ ; the sum of roots is 6 and the product of roots is 8; find the values of 'a' and 'b'.
- Q.52 Find the value of p ; if one root of quadratic equation  $3x^2 px 6 = 0$  is 3. Also, find the second (other) roots of the equation.
- **Q.53** If  $\alpha$  and  $\beta$  are the roots of the equation  $2x^2 + 5x - 4 = 0$ ; find the value of : (i)  $\alpha^2 + \beta^2$  (ii)  $\alpha^2 + \beta^2 - 3\alpha - 3\beta$ (iii)  $\alpha^2 + \beta^2 - 4\alpha\beta$  (iv)  $\alpha^3 + \beta^3$ (v)  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
- **Q.54** If  $\alpha$  and  $\beta$  are the roots of the equation,  $x^2 - 6x + 1 = 0$ ; find the value of :
  - (i)  $\alpha^2 + \beta^2$ (ii)  $\alpha^4 + \beta^4$ (iii)  $\alpha^3 + \beta^3$ (iv)  $\alpha^2 + \beta^2 - 2\alpha\beta$

Q.55 For each equation, given below, find the value (s) of p so that the equation has equal roots :

- (i)  $2x^2 7x + p = 0$
- (ii)  $6x^2 + 12x p = 0$
- (iii)  $px^2 + 4x + p = 0$
- (iv)  $2px^2 20x + (13p 1) = 0$
- (v)  $3px^2 + 18x + p = 0$

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# **ANSWER KEY**

# A. VERY SHORT ANSWER TYPE :

1.	(i), (ii),	(iii), (vi), (v	ii), (ix)	<b>2.</b> (i) 26 (ii)	) -18	(iii) 12 (iv)	$-19 (v) 5\sqrt{2}$	+ 1 (vi) -1	30 (vii) 173
3.	(i) $-\frac{7}{2}$ (ii)	$-\frac{29}{10}$		<b>4.</b> (i)	5. (	ii)	<b>6.</b> (i), (ii)	<b>7.</b> yes	
8.	no	<b>9.</b> (i) $-\frac{5}{8}$	(ii) $\frac{9}{4}$	$(iii) - a^2$	10.	no[only x =	3/2 is a solution	on of the giv	ven equation]
11.	-3, -2	<b>12.</b> 11, – 3		<b>13.</b> –8, 4	14.	-6, 1	<b>15.</b> 6, – 1	<b>16.</b> 3, 2	2 17. a, $-\frac{3a}{5}$
18.	0, -8	<b>19.</b> $\frac{a}{3}, -a$		<b>20.</b> 7, $-\frac{3}{4}$	21.	$\frac{3}{2}, -\frac{4}{5}$	<b>22.</b> $\frac{3}{4}, -\frac{1}{2}$	<b>23.</b> 3, -	$-\frac{2}{3}$ <b>24.</b> 0, $\frac{7}{4}$
25.	2, -5	<b>26.</b> 6, -3		<b>27.</b> $\frac{5}{2}, -\frac{5}{2}$					
28.	(i) Rational (	(real) and une	qual.	(ii) Rational	l (real) ar	nd uneq <mark>ual.</mark>	(iii) Rational a	and unequal	. (iv)Real and equal.
	(v) Imagina	ary		(vi) Irration	al and ur	nequal.	(vii) Real and	equal	
	(viii) Irration	nal and uneq	ual.	(ix) Irration	al and ur	nequal.			
29.	(i) 5 (ii)	41 (iii) -	- 3	(iv) $p^2 - 72$		(v) 9 + 20a	(vi) 25 –	16c (vii	) 91 (viii) –56
30.	(i) $\frac{7}{2}$ , 2 (ii)	$-\frac{4\sqrt{2}}{3}, 3$		(iii) $\frac{-5\sqrt{3}}{2}$	$-\frac{3}{2}$	(iv) $2\sqrt{5}$ , –	15 (v) 2, $\frac{3\sqrt{3}}{3}$	$\sqrt{\frac{5}{5}}$	
<u>B. </u>	B. SHORT ANSWER TYPE :								
31.	$\sqrt{5} + 2, \sqrt{2}$	$\overline{5} - 2$	<b>32.</b> 1, –	$\frac{5}{4}$	<b>33.</b> no :	real root.	34.	$\frac{5+\sqrt{7}}{2}, \frac{5-1}{2}$	$\frac{\sqrt{7}}{2}$
35.	1, 5		<b>36.</b> 1, -	$\frac{3}{2}$	<b>37.</b> <sup>3+</sup>	$\frac{\sqrt{19}}{5}, \frac{3-\sqrt{19}}{5}$	<u>9</u> <b>38.</b> 3	$\sqrt{2}, -\sqrt{2}$	
39.	$\sqrt{6}, -\frac{2}{\sqrt{6}}$		<b>40.</b> – 3	$\sqrt{3}, -\frac{-2}{\sqrt{3}}$	<b>41.</b> $\frac{1}{4}$ ,-	$-\frac{1}{4}$	<b>42.</b> 1	$,-\frac{4}{5}$	
43.	$1, \frac{3}{4}$		<b>44.</b> 0, 3		<b>45.</b> 0, -	<u>5</u> <u>3</u>			
46.	(i) p ≤ 4	(ii) $p \leq \frac{9}{8}$	(iii) p <sup>2</sup> 2	≥ 24 (iv)	$p^2 + 15$	≥0	(v) $p \ge -\frac{3}{2}$		
47.	(i) yes, −3 ∃	$\pm \sqrt{3}$	(ii) no	(iii)	) yes, -1,	$\frac{3}{4}$	(iv) yes, $-\frac{5}{3}$ ,	$-\frac{5}{3}$	(v) yes, $\frac{3}{2}$ , $\frac{3}{2}$
	(vi) no		(vii) yes	$5, \frac{3\pm\sqrt{21}}{6}$	(viii) ye	es, $-\sqrt{3}$ , $-\frac{\sqrt{4}}{4}$	$\frac{\overline{3}}{4}$		(ix) yes, $\frac{3\sqrt{5}}{5}$

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<b>48.</b> (i) $x^2 - 25 = 0$	(ii) $x^2 - 11x + 24 = 0$	(iii) $x^2 + 11x + 24 = 0$			
(iv) $x^2 + 5x - 24 = 0$	(v) $x^2 - 6\sqrt{3} x + 15 = 0$	(vi) $x^2 + \sqrt{2} x - 12 = 0$			
(vii) $x^2 + 7\sqrt{5} x + 60 = 0$	(viii) $x^2 - 2x - 1 = 0$	$(ix) x^2 - 8x - 11 = 0$			
$(x) x^2 - 14x + 42 = 0$	$(xi) 9x^2 - 18x + 7 = 0$	$(xii) 4x^2 - 16x + 11 = 0$			
C. LONG ANSWER TYPE :					
<b>49.</b> 0, 3 <b>50.</b> a = 7, c =	7 <b>51.</b> $a = \frac{1}{2}, b = 4$	<b>52.</b> $p = 7, -\frac{2}{3}$			
<b>53.</b> (i) $\frac{41}{4}$ (ii) $\frac{71}{4}$ (iii) $\frac{73}{4}$ (i	$(v) - \frac{245}{8}$ $(v) - \frac{41}{8}$	<b>54.</b> (i) 34 (ii) 1154 (iii) 198 (iv) 32			
<b>55.</b> (i) $6\frac{1}{8}$ (ii) $-6$ (iii) $\pm 2$ (i	v) 2, $-\frac{25}{13}$ (v) $\pm 3\sqrt{3}$				

# EXERCISE # 2

- Q.1 Find the value(s) of k for which each of the following quadratic equation has equal roots : (i)  $2x^2 + kx + 3 = 0$ (ii)  $(k + 4) x^2 + (k + 1)x + 1 = 0$ (iii)  $(k - 4) x^2 + 2(k - 4)x + 4 = 0$ (iv) kx (x - 2) + 6 = 0.
- Q.2 Find the value(s) of k for which the following quadratic equation has real roots (i)  $px^2 + 4x + 1 = 0$ (ii)  $4x^2 + 8x - p = 0$ (iii)  $2x^2 + px + 8 = 0$
- Q.3 Find the value(s) of k for which the following simultaneous linear equation have a unique solution :

(k-1) x - 3y = 4, 3x - (4k+1) y = 5

- **Q.4**(i) Find two consecutive natural numbers such that the sum of their squares is 365.
  - (ii) Find two consecutive integers such that the sum of their squares is 365.
  - (iii) If the product of two consecutive positive integers is 306, find the integers.
- **Q.5**(i) If the product of two positive consecutive odd integers is 255, find the integers.
  - (ii) If the product of two consecutive odd integers is 255, find the integers.
- Q.6 The sum of the squares of two consecutive odd natural numbers is 290, find the numbers.
- Q.7 The sum of the squares of two natural numbers is 116. If the square of the larger is 25 times the smaller, find the numbers.
- Q.8 The difference of squares of two numbers is 180. The square of the smaller number is 8 times the large number. Find the two numbers.
- **Q.9**(i) The sum of the square of three consecutive natural numbers is 110, find the numbers.
  - (ii) Three consecutive natural numbers are such that the square of the middle number exceeds

the different of the square of the other two by 60, find the numbers.

- Q.10 Divide 14 into two parts such that the sum of their reciprocals is  $\frac{7}{20}$ .
- Q.11 The difference of two natural number is 4 and the difference of their reciprocals is  $\frac{1}{8}$ , find the numbers.
- Q.12 The sum of the numerator and denominator of a certain fraction is 11. If 1 is added to both numerator and denominator, the fraction increases by  $\frac{3}{56}$ . Find the fraction.
- Q.13 The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is  $2\frac{16}{21}$ , find the fraction.
- Q.14 A two digit number contains the bigger at ten's place. The product of the digit is 27 and the difference between the two digits is 6. find the number.
- Q.15 A two digit number is such that the product of its digits is 24. When 18 is subtracted from this number, the digits interchange their places. Find the number.
- Q.16 Mukesh and Suresh together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. How many marbles they had to start with.
- Q.17 A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produces in a day. On a particular day, the total cost reduction was Rs. 750. Find the number of toys produced on that day.

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- Q.18 The area of rectangular plot is 528 m<sup>2</sup>. The length of the plot (in meters) is one more than twice its breadth. find the length and breadth of the plot.
- Q.19 A rectangle has an area of 24 cm<sup>2</sup>. If the perimeter is 20 cm, find its length.
- **Q.20** A rectangular garden 10 m by 16 m is to be surrounded by a concrete walk of uniform width. If the area of the walk is  $120 \text{ m}^2$ , find the width of the walk.
- Q.21 Harish made a rectangular garden with its length 5 meters more than its breadth. Next year, he increased the length by 3 metres and decreased the width by 2 meters. If the area of the garden is 119 sq. m, was this garden larger or smaller ?
- Q.22 The sum of the areas of two squares is  $468 \text{ m}^2$ . If the difference of their perimeters is 24 m, find the sides of the two squares.
- Q.23 The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.
- Q.24 A wire, 112 cm long is bent to form a right angled triangle. If the hypotenuse is 50 cm long, find the area of the triangle.
- Q.25 A rectangular park is to be designed whose length is 3m more than its breadth. Its area is 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m (Shown in the adjoining figure). Find the dimensions of the rectangular park.



- Q.26 A school bus transported an excursion party to a picnic spot 150 km away. While returning it was raining and the bus had to reduce its speed by 5 km / hr, and it took one hour longer to make the return trip. Find the time taken in return trip.
- Q.27 An aeroplane flying with a wind of 30 km / hr takes 40 minutes less of fly 3600 km, than what it would have taken to fly the same wind. Find the plane's speed in still air.
- Q.28 A motor boat whose speed is 18 km/hr in still water takes 1 hour more to go 24 km upstream than to return to the same spot. Find the speed of the stream.
- Q.29 When the price of an article is reduced by Rs 2, 5 more articles could be bought for Rs 120. Find the original price of each article.
- Q.30 A trader bought a number of articles for Rs 900, five were damaged and he sold each of the rest at Rs 2 more than what he paid for it thus getting a profit of Rs 80 on the whole transaction. Find the number of articles he bought.
- Q.31 Rahul sold an article for Rs 56 which cost him Rs x. He finds that he has gained x% on his outlay. Find x.
- Q.32 (i) Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. What is Rohan's present age ?
  - (ii) Forty years hence Mr. Pratap's age will be square of what it was 32 years ago. Find his present age.
  - (iii) The sum of the ages of father and his son is45 years. Five years ago, the product of their ages (in years) was 124. Find the present ages.
- Q.33 The age of a man is twice the square of the age of his son. Eight years hence, the age of the man will be 4 years more than three times the age of his son. Find their present ages.

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Q.34 B takes 16 days less than A to do a piece of work. If both working together can do it in 15

days, in how many days will be alone complete the work ?

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	ANSWER RET							
1.	(i) $2\sqrt{6}, -2\sqrt{6}$ (ii)	5, -3 (iii) 8 (iv) 6	<b>2.</b> (i) $p \le 4$ (ii) $p \ge -4$ (iii) $p \ge 8$ or $p \le -8$					
3.	All real nos except 2	and $-\frac{5}{4}$	<b>4.</b> (i) 13, 14 (ii) 13, 14 or -13, -14 (iii) 17, 18					
5.	(i) 15, 17 (ii) 15, 17	or -15, -17	<b>6.</b> 11, 13	<b>7.</b> 4, 10	<b>8.</b> 18, 12 or 18, -12			
9.	(i) 5, 6, 7 (ii) 9, 10,	11	<b>10.</b> 4, 10	<b>11.</b> 8, 4	<b>12.</b> $\frac{4}{7}$			
13.	$\frac{3}{7}$	<b>14.</b> 93	<b>15.</b> 64	<b>16.</b> 9, 36				
17.	25 or 30	<b>18.</b> 33 m, 16 m		<b>19.</b> 6 cm				
20.	2 m.	<b>21.</b> smaller by 7 sq. m.		<b>22.</b> 18 m, 12 m				
23.	12 cm, 5 cm	<b>24.</b> $336 \text{ cm}^2$		<b>25.</b> 7 m × 4 m				
26.	6 hours	<b>27.</b> 570 km/hr	<b>28.</b> 6 km/ hr	<b>29.</b> Rs. 8				
30.	75	<b>31.</b> 40	<b>32.</b> (i) 7 years (ii) 41	l years (iii) 36 ye	ars, 9 years			
33.	32 years, 4 years	<b>34.</b> 24 days						

## ANSWER KEY

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