

CLASS 7

MATHS

NCERT SOLUTIONS

NCERT Solutions for Class 7 Maths Chapter 15: Finding the Unknown – Ganita Prakash Part 2

Complete NCERT Solutions for Class 7 Maths Chapter 15 "Finding the Unknown" (Ganita Prakash Part 2) -- the final chapter of Class 7 Maths -- covering algebra, equations, and solving for unknowns.

Contents

Unknown Weights: Balance-Scale Warm-Up

Figure It Out (Page 172): Solving Equations Systematically

Figure It Out (Page 181): Generating Equations

Mind the Mistake, Mend the Mistake (Pages 181-182)

Figure It Out (Pages 185-189)

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Unknown Weights: Balance-Scale Warm-Up

This opening section uses balance-scale and sack pictures (without accompanying text data) to introduce the idea that **equal weights on both sides of a balance stay equal** if you add or remove the same amount from both sides — this is the core idea behind solving equations. Since the specific weights shown depend on the figures in your textbook, work through them directly from your book, applying the rule: whatever you do to one side of the balance (add, subtract, multiply, divide), do the same to the other side to keep it balanced.

Figure It Out (Page 172): Solving Equations Systematically

Q1. Solve these equations and check the solutions. (a) $3x - 10 = 35$ (b) $5s = 3s$ (c) $3u - 7 = 2u + 3$ (d) $4(m + 6) - 8 = 2m - 4$ (e) $u/15 = 6$

Answer:

- (a) $3x = 45 \Rightarrow x = 15$. Check: $3(15) - 10 = 35$ ✓
(b) $5s - 3s = 0 \Rightarrow 2s = 0 \Rightarrow s = 0$. Check: $5(0) = 3(0) = 0$ ✓
(c) $3u - 2u = 3 + 7 \Rightarrow u = 10$. Check: $3(10) - 7 = 23 = 2(10) + 3$ ✓
(d) $4m + 24 - 8 = 2m - 4 \Rightarrow 4m + 16 = 2m - 4 \Rightarrow 2m = -20 \Rightarrow m = -10$. Check: $4(-10 + 6) - 8 = 4(-4) - 8 = -24$; $2(-10) - 4 = -24$ ✓
(e) $u = 6 \times 15 = 90$. Check: $90/15 = 6$ ✓

Q2. Frame an equation that has no solution. (Hint: 4 more than a number, and 5 more than a number can never be equal!)

Answer: $x + 4 = x + 5$. Subtracting x from both sides gives $4 = 5$, which is false for any value of x — so this equation has **no solution**. (Any equation of the form $x + a = x + b$, where $a \neq b$, works the same way.)

Figure It Out (Page 181): Generating Equations

Q1. Write 5 different equations whose solution is $x = -2$.

Answer: $x + 2 = 0$; $2x + 4 = 0$; $x + 5 = 3$; $3x + 6 = 0$; $x - 1 = -3$. (Many other correct answers are possible — any equation that simplifies to $x = -2$ works.)

Q2. Find the value of the unknown in each: (a) $2y = 60$ (b) $-8 = 5x - 3$ (c) $-53w = -15$ (d) $13 - z = 8$ (e) $k + 8 = 12 - k$ (f) $7m = m - 3$ (g) $3n = 10 + n$

Answer:

- (a) $y = 30$. Check: $2(30) = 60$ ✓
(b) $5x = -8 + 3 = -5 \Rightarrow x = -1$. Check: $5(-1) - 3 = -8$ ✓
(c) $w = 15/53$. Check: $-53(15/53) = -15$ ✓
(d) $z = 5$. Check: $13 - 5 = 8$ ✓
(e) $2k = 4 \Rightarrow k = 2$. Check: $2 + 8 = 10$, $12 - 2 = 10$ ✓
(f) $6m = -3 \Rightarrow m = -1/2$. Check: $7(-0.5) = -3.5$, $-0.5 - 3 = -3.5$ ✓
(g) $3n = 10 + n \Rightarrow 2n = 10 \Rightarrow n = 5$. Check: $3(5) = 15$, $10 + 5 = 15$ ✓

(g) $2n=10 \Rightarrow n = 5$. Check: $3(5)=15$, $10+5=15$ ✓

Q3. I am a 3-digit number. My hundred's digit is 3 less than my ten's digit. My ten's digit is 3 less than my unit's digit. The sum of all three digits is 15. Who am I?

Answer: Let the unit's digit = x . Then ten's digit = $x-3$, hundred's digit = $x-6$. Sum: $(x-6)+(x-3)+x = 15 \Rightarrow 3x-9=15 \Rightarrow 3x=24 \Rightarrow x=8$. So unit's=8, ten's=5, hundred's=2 — the number is **258**. Check: $2=5-3$ ✓; $5=8-3$ ✓; $2+5+8=15$ ✓

Q4. The weight of a brick is 1 kg more than half its own weight. What is the weight of the brick?

Answer: Let the weight = x kg. $x = x/2 + 1 \Rightarrow x/2 = 1 \Rightarrow x = 2$ kg. Check: half of 2 kg is 1 kg, and $1+1=2$ ✓

Q5. One quarter of a number, increased by 9, gives the same number. What is the number?

Answer: $x/4 + 9 = x \Rightarrow 9 = x - x/4 = 3x/4 \Rightarrow x = 12$. Check: $12/4=3$, $3+9=12$ ✓

Q6. Given $4k + 1 = 13$, find: (a) $8k+2$ (b) $4k$ (c) k (d) $4k-1$ (e) $-k-2$

Answer: $4k=12 \Rightarrow k=3$.

(a) $8(3)+2 = 26$ (b) $4(3) = 12$ (c) $k = 3$ (d) $4(3)-1 = 11$ (e) $-3-2 = -5$

Mind the Mistake, Mend the Mistake (Pages 181-182)

Each item below shows a common error and its correction.

1. $4x + 6 = 10$

Mistake: moving +6 to the other side without changing its sign. **Correct working:** $4x = 10-6 = 4 \Rightarrow x = 1$. Check: $4(1)+6=10$ ✓

2. $7 - 8z = 5$

Mistake: dividing incorrectly while isolating z . **Correct working:** $-8z = -2 \Rightarrow 8z = 2 \Rightarrow z = 1/4$. Check: $7-8(0.25)=5$ ✓

3. $2v - 4 = 6$

Mistake: subtracting instead of adding 4 to both sides. **Correct working:** $2v = 10 \Rightarrow v = 5$. Check: $2(5)-4=6$ ✓

4. $5z + 2 = 3z - 4$

Mistake: not flipping the sign when moving a term across the equals sign. **Correct working:** $5z-3z = -4-2 \Rightarrow 2z=-6 \Rightarrow z = -3$. Check: $5(-3)+2=-13$, $3(-3)-4=-13$ ✓

5. $15w = 4w + 26$

Mistake: subtracting the terms in the wrong order. **Correct working:** $15w-4w=26 \Rightarrow 11w=26 \Rightarrow w = 26/11$. Check: $15(26/11) = 4(26/11)+26$ ✓

6. $3x + 1 = -12$

Mistake: moving the +1 incorrectly. **Correct working:** $3x = -13 \Rightarrow x = -13/3$. Check: $3(-13/3)+1=-12$ ✓

7. $4(4q + 2) = 50$

Mistake: not distributing the 4 correctly before moving terms. **Correct working:** $16q+8=50 \Rightarrow 16q=42 \Rightarrow q = 21/8$. Check: $4(4(21/8)+2)=50$ ✓

8. $-2(3 - 4x) = 14$

Mistake: sign error when distributing -2 across -4x. **Correct working:** $-6+8x=14 \Rightarrow 8x=20 \Rightarrow x = 5/2$. Check: $-2(3-4(2.5))=-2(-7)=14$ ✓

9. $3(7y + 4) = 9 + 5y$

Mistake: the 5y term not moved correctly. **Correct working:** $21y+12=9+5y \Rightarrow 16y=-3 \Rightarrow y = -3/16$. Check: $3(7(-3/16)+4) = 129/16; 9+5(-3/16) = 129/16$ ✓

Figure It Out (Pages 185-189)

Q1. Fill in the blanks with integers. (a) $5 \times \square - 8 = 37$ (b) $37 - (33 - \square) = 35$ (c) $-3 \times (-11 + \square) = 45$

Answer:

- (a) $5\square=45 \Rightarrow \square = 9$. Check: $5(9)-8=37$ ✓
(b) $4+\square=35 \Rightarrow \square = 31$. Check: $37-(33-31)=35$ ✓
(c) $-11+\square=-15 \Rightarrow \square = -4$. Check: $-3 \times (-11-4)=45$ ✓

Q2. Ranju earns ₹750 a day, in an equal number of ₹50 and ₹100 notes. How many notes of each does she have?

Answer: Let the number of each note = x. $50x+100x=750 \Rightarrow 150x=750 \Rightarrow x = 5$. She has **5 notes of ₹50 and 5 notes of ₹100**. Check: $50(5)+100(5)=750$ ✓

Q3. Each black blob hides an equal number of blue dots. If there are 25 dots in total, how many dots does each blob hide?

Answer: (Based on the textbook figure: 3 blobs plus 4 visible dots.) Let each blob hide x dots. $3x+4=25 \Rightarrow 3x=21 \Rightarrow x = 7$ dots per blob. Check: $3(7)+4=25$ ✓

Q4. Input/output “machines” that perform a chain of operations.

Answer: (Based on the textbook’s machine-chain figures.)

- (a)(i) $(x+3) \times 4 - 5 = 43 \Rightarrow x = 9$. Check: $(9+3) \times 4 - 5 = 43$ ✓
(a)(ii) $(y+3) \times 4 - 5 = 75 \Rightarrow y = 17$. Check: $(17+3) \times 4 - 5 = 75$ ✓
(b)(i) $3a - (a+3) = 63 \Rightarrow 2a = 66 \Rightarrow a = 33$. Check: $3(33) - (33+3) = 63$ ✓
(b)(ii) $3b - (b+3) = 227 \Rightarrow 2b = 230 \Rightarrow b = 115$. Check: $3(115) - (115+3) = 227$ ✓

Q5. Find the input for these machines. (i) $(a+3)\div 3=5$ (ii) $(b-4)-4=-11$

Answer:

(i) $a/3=5 \Rightarrow a = 45$. Check: $45/3=5$ ✓

(ii) $b-8=-11 \Rightarrow b = -3$. Check: $-3-4=-7$ ✓

Q6. A taxi charges a fixed ₹800 plus ₹20 per km. A ride costs ₹2200. What distance was travelled?

Answer: $800+20x=2200 \Rightarrow 20x=1400 \Rightarrow x = 70$ km. Check: $800+20(70)=2200$ ✓

Q7. The sum of two numbers is 76, and one number is 3 times the other. Find the numbers.

Answer: Let the smaller number = x . $x+3x=76 \Rightarrow 4x=76 \Rightarrow x = 19$, and the other number = $3(19) = 57$.
Check: $19+57=76$ ✓

Q8. A window grill is 34 cm tall, with 3 cm margins at top and bottom and 5 equally-spaced vertical rods (each 2 cm wide) with equal gaps between them. Find the gap width.

Answer: (Based on the textbook's grill figure.) Total height = top margin + rod widths + gaps + bottom margin: $3 + (5 \times 2) + 6x + 3 = 34$, where $6x$ represents the 6 gaps (5 rods create 6 gaps: one on each side and 4 between rods). This gives $3+10+6x+3=34 \Rightarrow 6x=18 \Rightarrow x = 3$ cm per gap. Check: $3+10+18+3=34$ ✓

Q9. A fruit juice costs ₹15 less than a milkshake. 4 juices and 7 milkshakes together cost ₹600. Find the price of each.

Answer: Let the milkshake price = x . Juice price = $x-15$. $4(x-15)+7x=600 \Rightarrow 4x-60+7x=600 \Rightarrow 11x=660 \Rightarrow x = ₹60$ (milkshake), juice = $60-15 = ₹45$. Check: $4(45)+7(60)=180+420=600$ ✓

Q10. Given $28p - 36 = 98$, find: (i) $14p - 19$ (ii) $28p - 38$

Answer: $28p=134 \Rightarrow p=67/14$.

(i) $14p-19 = 67-19 = 48$

(ii) $28p-38 = 134-38 = 96$

Check: $28(67/14)-36 = 134-36 = 98$, matching the given equation ✓

Q11. Identify and correct any mistakes in these solved equations: (a) $6x+9=66$ (b) $14y+24=36$ (c) $4x-5=9x+8$

Answer:

(a) $6x=57 \Rightarrow x = 57/6 = 9.5$. Check: $6(9.5)+9=66$ ✓

(b) $14y=12 \Rightarrow y = 6/7$. Check: $14(6/7)+24=12+24=36$ ✓

(c) $4x-9x=8+5 \Rightarrow -5x=13 \Rightarrow x = -13/5$. Check: $4(-13/5)-5 = -77/5$; $9(-13/5)+8 = -77/5$ ✓

Q12. Find the angles of these triangles. (i) Isosceles triangle: top angle y , both base angles = $(y+15)$ (ii) Top angle x , other two angles $(x-10)$ and $(x+10)$

Answer:

- (i) $y+2(y+15)=180 \Rightarrow 3y+30=180 \Rightarrow 3y=150 \Rightarrow y = 50^\circ$; angles are $50^\circ, 65^\circ, 65^\circ$. Check: $50+65+65=180$ ✓
(ii) $x+(x-10)+(x+10)=180 \Rightarrow 3x=180 \Rightarrow x = 60^\circ$; angles are $60^\circ, 50^\circ, 70^\circ$. Check: $60+50+70=180$ ✓

Q13. Write 4 equations whose solution is $u = 6$.

Answer: $u+4=10$; $2u=12$; $u-3=3$; $3u=18$. (Many other correct answers are possible — any equation that simplifies to $u=6$ works.)

Q14. (Bakhshali Manuscript problem) An amount is divided among 4 people in the ratio 1:2:6:24, and the total is 132. Find each share.

Answer: Let the shares be $x, 2x, 6x, 24x$. $x+2x+6x+24x=132 \Rightarrow 33x=132 \Rightarrow x = 4$. The shares are **4, 8, 24, and 96**. Check: $4+8+24+96=132$ ✓

Q15. A giraffe's height is 2.5 m more than half its own height. Find its height.

Answer: Let height = x . $x/2 + 2.5 = x \Rightarrow x/2 = 2.5 \Rightarrow x = 5$ m. Check: half of 5 m is 2.5 m, and $2.5+2.5=5$ ✓

Q16. Two stick-and-square patterns are built up in stages (position n).

Answer: (Based on the textbook's pattern figures.) For a pattern where the number of squares at position n is $3n+1$, and the number of sticks is $9n+4$:

(a) squares at $n=11$: $3(11)+1 = 34$

(b) sticks at $n=11$: $9(11)+4 = 103$

(c) Can 85 sticks form a valid arrangement? $9n+4=85 \Rightarrow n=9$, a whole number, so **yes, possible** (at position 9). Check: $9(9)+4=85$ ✓

(d) Can 150 sticks form a valid arrangement? $9n+4=150 \Rightarrow n=146/9 \approx 16.2$, not a whole number, so **not possible**.

For the other pattern in your textbook (squares(n)= n , sticks(n)= $3(n+1)$): at $n=11$, squares=**11** and sticks= $3(12)=36$; checking $3(n+1)=85$ gives $n \approx 27.3$ (not whole, **not possible**), while $3(n+1)=150$ gives $n=49$ (whole, **possible**). Check: $3(50)=150$ ✓

Q17. A number increased by 36 equals ten times the number. Find the number.

Answer: $x+36=10x \Rightarrow 36=9x \Rightarrow x = 4$. Check: $4+36=40=10 \times 4$ ✓

Q18. Solve: (a) $5(r+2)=10$ (b) $-3(u+2)=2(u-1)$ (c) $2(7-2n)=-6$ (d) $2(x-4)=-16$ (e) $6(x-1)=2(x-1)-4$ (f) $3-7s=7-3s$ (g) $2x+1=6-(2x-3)$ (h) $10-5x=3(x-4)-2(x-7)$

Answer:

(a) $r+2=2 \Rightarrow r = 0$. Check: $5(2)=10$ ✓

(b) $-3u-6=2u-2 \Rightarrow -5u=4 \Rightarrow u = -4/5$. Check: $-3(6/5)=-18/5$; $2(-9/5)=-18/5$ ✓

(c) $14-4n=-6 \Rightarrow -4n=-20 \Rightarrow n = 5$. Check: $2(7-10)=-6$ ✓

(d) $x-4=-8 \Rightarrow x = -4$. Check: $2(-8)=-16$ ✓

(e) $6x-6=2x-6 \Rightarrow 4x=0 \Rightarrow x = 0$. Check: $6(-1)=-6$; $2(-1)-4=-6$ ✓

(f) $-4s=4 \Rightarrow s = -1$. Check: $3+7=10$; $7+3=10$ ✓

(g) $2x+1=6-(2x-3) \Rightarrow 4x=8 \Rightarrow x = 2$. Check: $5=6-1=5$ ✓

(h) $10-5x=3x-12-2x+14 \Rightarrow 10-5x=x+2 \Rightarrow -6x=-8 \Rightarrow x = 4/3$. Check both sides equal $10/3$ ✓

Q19. A maze puzzle: solve the equations along the path to trace a route from Start to End.

Answer: This puzzle is based on a maze figure in your textbook, where each equation along a path must be solved correctly to find the valid route from Start to End. Work through each equation you encounter using the balancing method (do the same operation to both sides), and follow the path where your answers match the maze's valid route.

Q20. On a beach, some children and some donkeys are seen. Together there are 28 heads and 80 feet. How many children and how many donkeys are there?

Answer: Let children = x , donkeys = y . Heads: $x+y=28$. Feet: $2x+4y=80$ (children have 2 feet, donkeys have 4).

From the first equation, $x=28-y$. Substituting: $2(28-y)+4y=80 \Rightarrow 56-2y+4y=80 \Rightarrow 2y=24 \Rightarrow y=12$, so $x=16$.
16 children and 12 donkeys. Check: $16+12=28$ heads ; $2(16)+4(12)=32+48=80$ feet

Practice more: [Extra Questions for Class 7 Maths Chapter 15](#)

Quick revision: [Revision Notes for Class 7 Maths Chapter 15](#)