31 July

AVERAGES

1. $\frac{a+b+c+d+e}{5} = \frac{a+(a+2)+(a+4)+(a+6)+(a+8)}{5}$

$\frac{5a+20}{5} = (a+4)$

2 → 1 3 = 4

1 3 5 → 9 Value nikalni. $a=1$ $b=3$ $c=5$ $d=7$ $e=9$

$\frac{1+3+5+7+9}{5} = \frac{25}{5} = \boxed{5}$ → can be written as $(a+4)$ → 1

★ Agar sequence mai common difference same chale toh avg = $\frac{\text{first val} + \text{last val}}{2}$

★ values choti se badi mai lgi honi chahiye

6. $\frac{\text{sum}}{8} = 14$ → $\frac{\text{sum} - 16}{8} = ?$ (8×2)

$\frac{\text{sum}}{8} - \frac{16}{8} = 14 - 2 = 12$

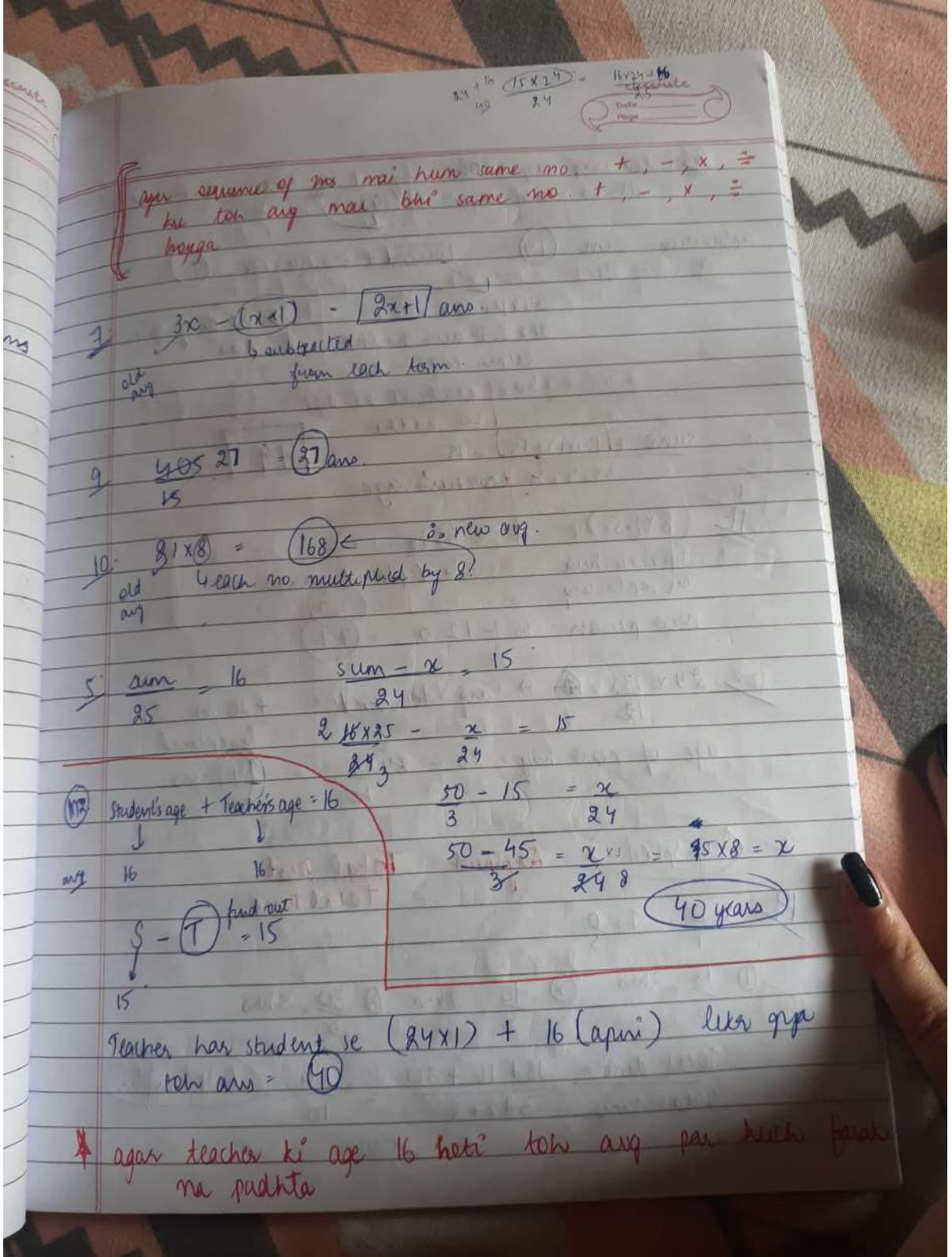
9. 40 / 5

10. 81 old avg

5. sum / 25

12. Student's ↓ avg 16 ↓ 15 Teach

★ ago



agar sequence of nos mai hum same no. +, −, ×, ÷ kr toh avg mai bhi same no. +, −, ×, ÷ hoyga

7. $3x - (x+1) - \boxed{2x+1}$ ans.
old avg — subtracted from each term.

9. $\frac{405}{15}\ 27 = (27)$ ans.

10. $8 \times 8 = (168) \leftarrow$ i.e. new avg.
old avg — each no. multiplied by 8

5. $\frac{sum}{25} = 16$ $\quad \frac{sum - x}{24} = 15$

$\frac{16 \times 25}{24} - \frac{x}{24} = 15$

$\frac{50}{3} - 15 = \frac{x}{24}$

$\frac{50 - 45}{3} = \frac{x}{24}$ $\quad = 5 \times 8 = x$

40 years

(Q12) Student's age + Teacher's age = 16
↓ ↓
avg 16 16

S − (T) find out = 15
↓
15

Teacher has student se (24×1) + 16 (apni) leke gpa toh ans = (40)

* agar teacher ki age 16 hoti toh avg par kuch farak na padhta

8. teacher aaya ~~toh~~ avg 1 se increase hui sabki
15 vo khud laya + (34×1)

explanation sum = (14). [sum] + (teacher's age) = (15)
34 35

34×14 tha
abe 1.1 aur badha
sum mai - as
har student ki age
1 se badhi

15 avg given hai.

$\frac{sum + [(34 \times 1) + 15]}{35} = 15$

↳ teacher's age

[49].

11. (8×1.5) + 65 kg
increase hua on replacing
↳ replaced person

new person = 65 + 12.0 = (77)

12. $24 \times \frac{3}{12}$ → avg decreased. + 20 yrs ↳ replaced

age of new boy = $20 - \frac{24 \times 3}{12}$ = (14) yrs.

(Avg Speed)

Avg Speed = $\frac{\text{Total Dist}}{\text{Total time}}$

19. $S = \frac{D}{T}$ $T = \frac{D}{S}$

① $\frac{18}{6} = 3$ hrs ② $\frac{16}{8} = 2$ hrs ③ $\frac{30}{6} = 5$ hrs

$\frac{\text{Total dist}}{\text{Total time}} = \frac{18 + 16 + 30}{3+2+5} = \frac{64}{10} =$ (6.4 km/hr)

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17 (d)

practice

$S \times T = D$

(11) jab bhi same dist given ho & 2 different speeds di ho tow

Avg speed = $\frac{2 S_1 S_2}{S_1 + S_2}$

Avg speed = $\frac{2 \times 40 \times 30}{40+30} = \frac{2400}{70} = 34.285$ km/hr

34.29 km/hr mark kiya as None of these given hai

(12) equal dist given hai tow koi bhi dist assume krlo jo 40 & 30 dono se divide hoje — basically LCM.

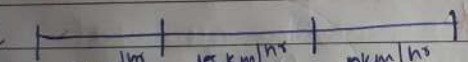
Avg speed = $\frac{\text{Total Dist}}{\text{Total time}}$

$= \frac{120+120}{\frac{120}{40} + \frac{120}{30}} = \frac{240}{7} = 34.285$ km/hr

10	40, 30
	4, 3

$10 \times 4 \times 3 = 120$

18.



Avg speed = $\frac{60+60+60}{\frac{60}{20} + \frac{60}{15} + \frac{60}{10}} = \frac{180 \text{ km/hr}}{13}$

5	20, 15, 10
2	4, 3, 2
	2, 3, 1

LCM = $10 \times 2 \times 3 = 60$

Mixed fraction = $\frac{13 \times 13 + 11}{13} = \frac{180}{13}$ km/hr

a) $13\frac{11}{13}$ km/hr b) $11\frac{11}{13}$ km/hr c) $13\frac{3}{13}$ km/hr

d) $11\frac{3}{13}$ km/hr e) None of these

$S \times \frac{1}{T} = D$

Shortcut

$$\frac{3S_1 S_2 S_3}{S_1S_2 + S_2S_3 + S_1S_3}$$

29. Avg speed = $\frac{2400 \times 4}{2400 + 2400 + 2400 + 2400}$

$= \frac{2400 \times 4}{25} = \frac{24 \times 100 \times 4}{25}$

$= 384$ km/hr ans.

2	2, 4, 6, 8
2	1, 2, 3, 4
	1, 1, 3, 2

LCM = $4 \times 3 \times 2 = 24$

$16 \times 24 = (20-4)(20+4) = 20^2 - 4^2$

$(a-b)(a+b) \quad a^2 - b^2$

$= 400 - 16 = 384$

28. $\frac{t_1 \times v_1 + t_2 \times v_2}{t_1 + t_2}$ km/hr $\quad D = S \times T$

unequal distances - different speeds

20. $\frac{1}{4}$ d $\rightarrow$ 8km/hr $\quad \frac{3}{5}$ d $\Rightarrow$ 6km/hr $\quad$ remaining = 10km

koi aisa no. jo 4 x 5 se easily divide ho

LCM(4,5) = 20

M1. Total dist = $\frac{20}{4} + \frac{20 \times 3}{5} + 3$

total time $\frac{5}{8} + \frac{22}{6} + \frac{3}{10}$

avg speed = $20 \div \frac{5}{8} + \frac{2+3}{10}$

$20 \div \frac{25+80+12}{40} = \frac{20 \times 40}{117} = \frac{800}{117}$

$6\frac{98}{117}$ km/hr

(M) mai total dist 20 assume kiya, jo ki calculations tough kiya total time ki toh 20 ka koi multiple lelo. eg 100 agar 20 4, 5 se divide hota hai toh 100 bhi hoga.

total dist = $\frac{100}{4}^{25} + \frac{100 \times 3}{5}^{20} + (100 - 85) = 100$

total time = $\frac{25}{8} + \frac{60}{6} + \frac{15}{10} = \frac{375 + 1200 + 180}{120}$

$= \frac{1775}{120}$

avg speed = $100 \times \frac{120}{1775}$

Lekin 100 se bhi kuch fayda ni hua toh 4, 5, 6, 8, 10 ka LCM lo. kyuki humme aisa no. chahiye jo in sabse divide ho.

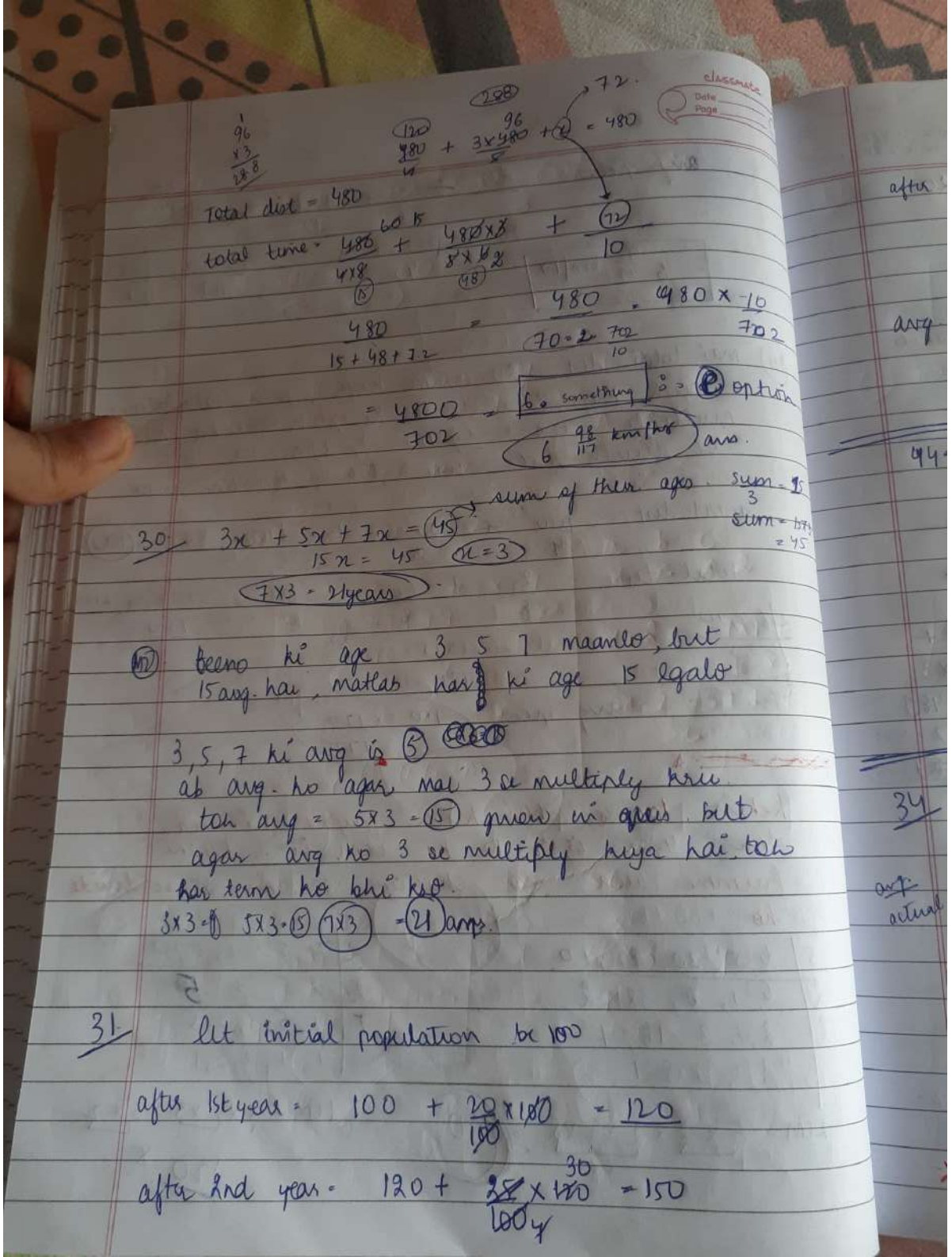
5	4, 5, 30, 32, 10
2	4, 1, 6, 32, 2
2	2, 1, 3, 16, 1
	1, 1, 3, 8, 1

LCM = $5 \times 2 \times 2 \times 3 \times 8 = 480$

2	4, 5, 6, 8, 10
2	2, 5, 3, 4, 5
5	1, 5, 3, 2, 5
	1, 1, 3, 2, 1

LCM = $2 \times 2 \times 5 \times 3 \times 2$

120 ✗



Total dist = 480

total time = $\frac{480}{4\times 8}$ + $\frac{480\times 3}{5\times 8}$ + $\frac{72}{10}$

$\frac{480}{15+48+72}$ = $\frac{480}{70.2}$ = $\frac{480\times 10}{702}$

= $\frac{4800}{702}$ = 6. something ∴ (e) option

6 $\frac{98}{117}$ km/hr ans.

30. $3x + 5x + 7x = 45$ → sum of their ages. sum = 45

$15x = 45$ $x = 3$

$7\times 3 = 21$ years.

32. teeno ki age 3 5 7 maanlo, but 15 avg. hai, matlab har ki age 15 legalo

3, 5, 7 ki avg is 5

ab avg. ko agar mai 3 se multiply krii toh avg = $5\times 3 = 15$ pr wo ki ages. but agar avg ko 3 se multiply kiya hai toh har term ko bhi kro.

$3\times 3 = 9$ $5\times 3 = 15$ 7×3 = 21 ans.

31. let initial population be 100

after 1st year = $100 + \frac{20}{100}\times 100 = 120$

after 2nd year = $120 + \frac{25}{100}\times 120 = 150$

after 3rd year = $150 + \frac{44}{100} \times 150 = 216$.

avg rate of increase = $\frac{\text{total increase}}{\text{time}} = \frac{216-100}{3 \text{ yrs}}$

$\frac{116}{3}$ = 38 something = $38\frac{2}{3}\%$

44% of 150 = (40+4)% of 150.

4x(10) + 4x(1) of 150.

10% of 150 = $\frac{10}{100} \times 150 = 15$ 4 times of 10% of 150 = 60 (4 x 15)

1% of 150 = $\frac{1}{100} \times 150 = 1.5$ 4 times of 1% of 150 = 6 (4 x 1.5)

44% of 150 = 60 + 6 = 66

34 $\frac{\text{sum}}{6} = 22$ $\frac{}{5}$

youngest ~~boy~~ -22 ko replace kiya jiski actual age is 7 (7)

avg will ↓.

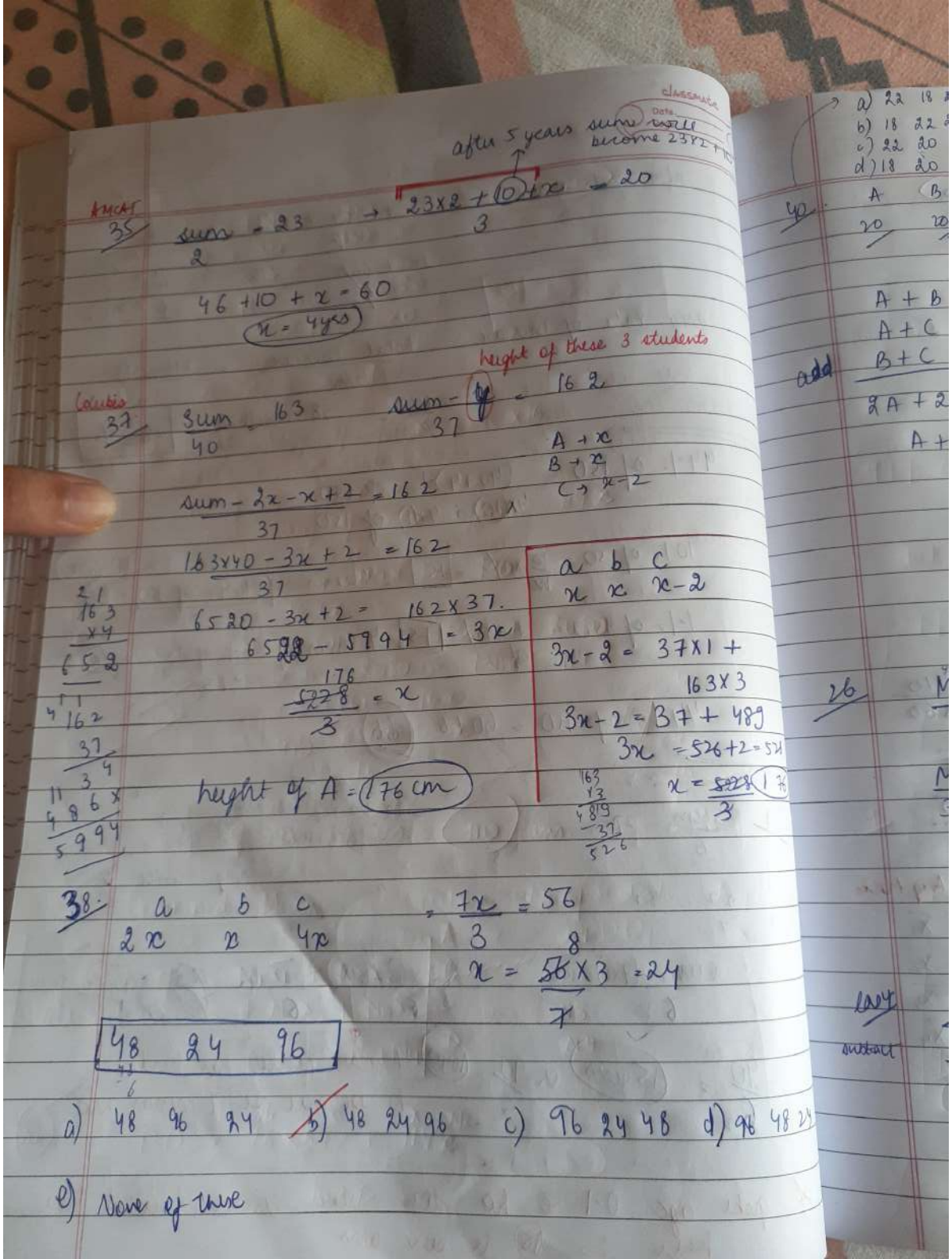
avg 22 22 22 22 22 22

actual 7

$\frac{\text{sum} - (7 \times 6)}{6} = ?$ $\frac{(22 \times 6) - (7 \times 6)}{6}$ $\frac{132 - 42}{6}$ $\frac{22 \times 6}{132}$

$\frac{90}{6x} = 15$ years or $\frac{90}{5} = 18$ yrs 7 years vehle har bande ki age mai se 7 minus kro

* giski age 0-1 se ho usu uski existence count nhi karta :. (18) is our ans



35 sum/2 = 23 → (23x2 + 10 + x)/3 = 20 (after 5 years sum will become 23x1+15)

46 + 10 + x = 60

x = 4yrs

36 sum/40 = 163 → sum = 163 x 40

37 sum/37 = 162 → sum = 162 x 37

sum - 2x - x + 2 = 162 x 37

163 x 40 - 3x + 2 = 162 x 37

6520 - 3x + 2 = 162 x 37

6520 - 5994 = 3x

3x = 526

x = 176 cm

height of A = 176 cm

height of these 3 students

A → x
B → x
C → x - 2

a	b	c
x	x	x - 2

3x - 2 = 37 x 1 + 163 x 3

3x - 2 = 37 + 489

3x = 526 + 2 = 528

x = 528/3 = 176

38:

a	b	c
2x	x	4x

7x/3 = 56/8

x = (56 x 3)/7 = 24

48 24 96

a) 48 96 24 b) 48 24 96 c) 96 24 48 d) 96 48 24

e) None of these

a) 22 18 20
b) 18 22 20
c) 22 20 18
d) 18 20 22

e) 24 20 22.

option elimination is one way

$\frac{22+18}{2} = 20$ $\frac{18+20}{2} = \frac{38}{2} = 19$ $\frac{22+20}{2} = \frac{42}{2} = 21$

40)

A	B	C replaces A			C replaces B	
		C	B	A	A	C
20	20	19	19		21	21

$A + B = 40$ —(1)
$A + C = 42$ —(2)
$B + C = 38$ —(3)

3 equations
3 variables
can be solved

add
$2A + 2B + 2C = 120$
$A + B + C = 60$ —(4)

(4) − (1)
$A + B + C - A - B = 60 - 40$
$C = 20$

(4) − (2)
$A + B + C - A - C = 60 - 42$
$B = 18$

(4) − (3)
$A + B + C - B - C = 60 - 38$
$A = 22$

26) $\frac{M + Tu + W}{3} = 40$ $\frac{Tu + W + Th}{3} = 41$ (Th = 42)

$\frac{M}{3} + \frac{Tu + W}{3} = 40$ $\frac{Tu + W}{3} = 41 - \frac{42}{3}^{14} = 27$

$\frac{M}{3} = 40 - 27$

$M = 13 \times 3 = 39°C$

easy
$M + Tu + W = 120$
$Tu + W + Th = 123$
subtract
$M - Th = -3$
$M = -3 + 42 = 39°C$

20) Eng + His = 110
Eng + Sci = 130

His − Sci = −20
Sci − His = 20

(ans = 20)

21) Q. Alg → 8

total salary of officers = 540 × 16

no. of non-officers = x
total salary of non-officers = $114x$

$$\frac{540 \times 16 + 114x}{16 + x} = 130$$

$8640 + 114x = 130x + 2080$
$8640 - 2080 = 130x - 114x$
$6560 = 16x$
$410 = \frac{6560}{16} = x$

No. of non-officers = 410 ans.

Combined Mean

Section	No. of Students	Avg Marks
A	N1	$\bar{X_1}$
B	N2	$\bar{X_2}$
C	N3	$\bar{X_3}$
D	N4	$\bar{X_4}$

$$\text{avg marks of all sections} = \frac{N_1\bar{X_1} + N_2\bar{X_2} + N_3\bar{X_3} + N_4\bar{X_4}}{N_1 + N_2 + N_3 + N_4}$$

(M2) using the formula → $130 = \frac{16 \times 540 + 114x}{16 + x}$