PRACTICE PAPER

ICSE CLASS 10 – MATHEMATICS

Chapter 23 : Graphical Representation

STEP-BY-STEP SOLUTIONS & MARKING SCHEME · Maximum Marks: 40

Results used

Inclusive → exclusive: adjustment factor = ½ (lower limit of next class − upper limit of the class); subtract it from every lower limit and add it to every upper limit.

Class mark = ½ (lower limit + upper limit). A 'less than' ogive plots (upper limit, cumulative frequency), starting from (lower limit of the first class, 0).

Median = value on the ogive at cumulative frequency N/2; between two plotted points the curve is taken as straight.

SECTION A (20 Marks)

Question 1 [8 × 1 = 8]

Part	Ans.	Working
(i)	**(b)**	Adjustment factor = ½(25 − 24) = 0.5, so 15 − 0.5 = 14.5 and 24 + 0.5 = 24.5.
(ii)	**(c)**	Class width = 8, so the class is 28 ± 4 = 24 – 32.
(iii)	**(a)**	A 'less than' ogive uses upper limits with cumulative frequencies.
(iv)	**(b)**	25 − 11 = 14.
(v)	**(d)**	The median corresponds to the cumulative frequency N/2.
(vi)	**(a)**	'More than 10' − 'more than 20' = 42 − 30 = 12.
(vii)	**(b)**	(A) is false: the ogive starts from the lower limit of the first class. (R) is true.
(viii)	**(c)**	Both true, and the adjustment factor 0.5 gives 20.5 – 30.5, 30.5 – 40.5.

Question 2 [4 + 4 + 4 = 12]

(i)

(a) Adjustment factor = ½ (31 − 30) = 0.5 [1]

Exclusive classes: 20.5–30.5, 30.5–40.5, 40.5–50.5, 50.5–60.5, 60.5–70.5 [1]

(b) Cumulative frequencies: 5, 5+9 = 14, 14+16 = 30, 30+12 = 42, 42+8 = 50 [1]

Less than	30.5	40.5	50.5	60.5	70.5
Cumulative frequency	5	14	30	42	50

Total = 50 ✓ [1]

(ii)

(a) Class width = 20 − 12 = 8, so half-width = 4 [1]

Classes: 8–16, 16–24, 24–32, 32–40, 40–48 [1]

(b) Cumulative frequencies: 6, 17, 32, 42, 50 [1]

Points: (8, 0), (16, 6), (24, 17), (32, 32), (40, 42), (48, 50) [1]

(iii)

(a) Reading the heights of the rectangles: [1]

Time (min)	10–20	20–30	30–40	40–50	50–60
Frequency	6	10	16	12	6

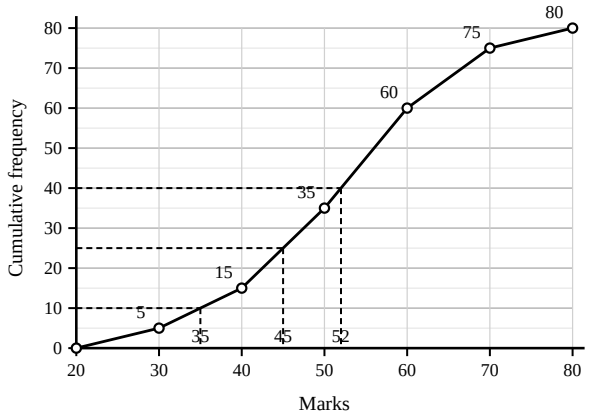
Total = 50 ✓ [1]

(b) 30 minutes or more = 16 + 12 + 6 [1]

= **34 students** [1]

SECTION B (20 Marks) — any two questions

Question 3 [3 + 3 + 4 = 10]



(i)

Cumulative frequencies at 30, 40, 50, 60, 70, 80 are 5, 15, 35, 60, 75, 80 [1]

Frequency = difference of successive cumulative frequencies: [1]

Marks	20–30	30–40	40–50	50–60	60–70	70–80
Frequency	5	10	20	25	15	5

Total = 80 ✓ [1]

(ii)

N/2 = 40. The ogive gives (50, 35) and (60, 60), so 40 lies between them [1]

Median = 50 + 10 × (40 − 35)/(60 − 35) = 50 + 2 [1]

= **52 marks** [1]

(iii)

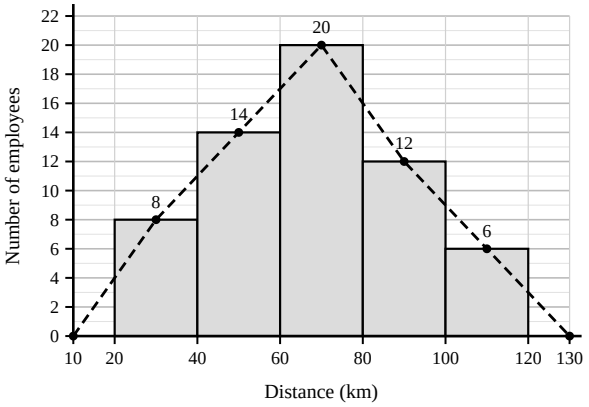
(a) At 35 (midway between (30, 5) and (40, 15)): c.f. = 5 + ½ × 10 [1]

= **10 students** [1]

(b) At 45 (midway between (40, 15) and (50, 35)): c.f. = 15 + ½ × 20 = 25 [1]

45 or more = 80 − 25 = **55 students** [1]

Question 4 [3 + 3 + 4 = 10]



(i)

Heights of the rectangles give the frequencies: [2]

Distance (km)	**20–40**	**40–60**	**60–80**	**80–100**	**100–120**
Frequency	8	14	20	12	6

Total = 8 + 14 + 20 + 12 + 6 = 60 ✓ [1]

(ii)

Class marks: 30, 50, 70, 90, 110 [1]

Points at the tops: (30, 8), (50, 14), (70, 20), (90, 12), (110, 6) [1]

End points on the x-axis (frequency 0): (10, 0) and (130, 0) [1]

(iii)

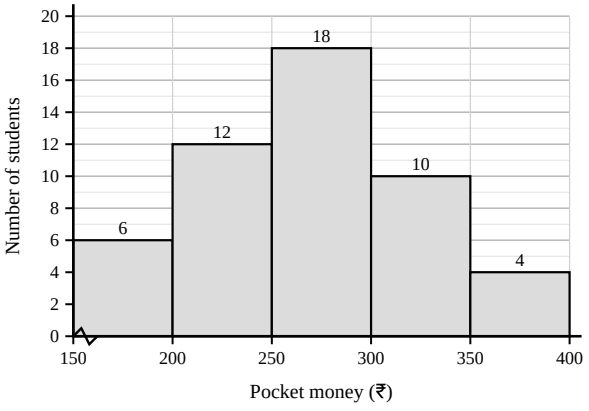
(a) Less than 60 km = 8 + 14 [1]

= **22 employees** [1]

(b) 80 km or more = 12 + 6 = 18 [1]

Percentage = 18/60 × 100 = **30%** [1]

Question 5 [3 + 3 + 4 = 10]



(i)

Heights of the rectangles give the frequencies: [2]

Pocket money (₹)	**150–200**	**200–250**	**250–300**	**300–350**	**350–400**
Frequency	6	12	18	10	4

Total = 6 + 12 + 18 + 10 + 4 = 50 ✓ [1]

(ii)

Cumulative frequencies: 6, 18, 36, 46, 50 [1]

Less than	**200**	**250**	**300**	**350**	**400**
Cumulative frequency	6	18	36	46	50

Points: (150, 0), (200, 6), (250, 18), (300, 36), (350, 46), (400, 50) [2]

(iii)

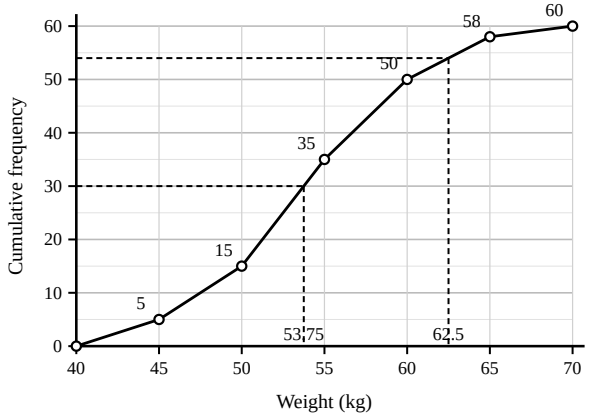
(a) N/2 = 25, which lies between c.f. 18 and 36 [1]

Median class = **250 – 300** [1]

(b) 275 is midway between (250, 18) and (300, 36) [1]

c.f. = 18 + ½ × 18 = **27 students** [1]

Question 6 [3 + 3 + 4 = 10]



(i)

From the ogive: c.f. at 60 kg = 50 and c.f. at 50 kg = 15 [2]

Students between 50 kg and 60 kg = 50 − 15 = **35** [1]

(ii)

N/2 = 30, between (50, 15) and (55, 35) [1]

Median = 50 + 5 × (30 − 15)/(35 − 15) = 50 + 3.75 [1]

= **53.75 kg** [1]

(iii)

(a) c.f. 15 is at (50, 15), so lower quartile = **50 kg** [2]

(b) 62.5 is midway between (60, 50) and (65, 58): c.f. = 50 + ½ × 8 = 54 [1]

Heavier than 62.5 kg = 60 − 54 = **6 students** [1]

— End of Solutions —