

SOLUTIONS

www.udgamwelfarefoundation.com

**For Best Mathematics E-Books, Visit:
www.mathstudy.in**

www.udgamwelfarefoundation.com

MASTER MATH FASTER & SMARTER!

Your Ultimate Digital Math Companion for Every Exam & Every Dream

✓ CBSE • ICSE • ISC • JEE • SAT • CAT • CTET • CUET & More!

Why Choose MathStudy.in?



Latest Pattern E-Books



Complete Chapter PDFs

Instant Access,
Anytime



Competitive Edge Gunkes



Case Study Based Learning

Unbelievably
Affordable!

For Students:

Special Features

- ◆ ****Board-Specific**** – CBSE, ICSE, ISC, State Boards
- ◆ ****Exam-Focused**** – JEE, SAT, CAT, CTET, CUET, NTSE
- ◆ ****Grade-Wise**** – Class 6 to 12
- ◆ ****Bilingual Options**** – English & Hindi Medium Support
- ◆ ****Printable & Shareable**** – Use offline, anytime

How to Order:

Visit : <https://www.mathstudy.in>

Browse by Exam, Class, or Topic

Add to Cart & Checkout

Contact & Support:

✉ Email: admin@mathstudy.in

💬 WhatsApp Support Available : +91-+91 92118 65759



💡 Why Wait? Empower your learning journey, save time, and achieve your dreams!

🌐 Explore & Start Learning Today:

<https://www.mathstudy.in> – Premium eBooks for success

<https://www.udgamwelfarefoundation.com> – Free PDFs, practice tests, & guida

MathStudy.in – Empowering Learners, Enabling Educators, Encouraging Excellence.
Digital Learning | Affordable Excellence | Trusted by Thousands

SOLUTIONS: AREAS OF PARALLELOGRAMS AND TRIANGLES

Mathematics | Class IX (2026/SOL-ARPARA/09/003)

Section A: Multiple Choice Questions

1. (b) 20 cm^2

Reason: The sum of areas of triangles formed by joining an interior point to the ends of opposite sides is half the area of the parallelogram. $\frac{1}{2} \times 40 = 20$.

2. (c) 48 cm^2

Reason: Area of parallelogram = $2 \times$ Area of triangle on same base and parallels = $2 \times 24 = 48$.

3. (c) 20 cm^2

Reason: $\text{Area}(\triangle ABD) = 2 \times \text{Area}(\triangle BED) = 10$. Since AD is median, $\text{Area}(\triangle ABC) = 2 \times \text{Area}(\triangle ABD) = 20$.

4. (b) They lie between the same parallels.

Reason: Triangles on the same base and having equal areas must lie between the same parallels.

5. (a) 8.75 cm

Reason: $\text{Area} = AB \times h_1 = AD \times h_2 \implies 10 \times 7 = AD \times 8 \implies AD = 70/8 = 8.75$.

6. (b) 24 cm^2

Reason: Area of rhombus formed by midpoints of rectangle = $\frac{1}{2} \times \text{Area}(\text{Rect}) = \frac{1}{2} \times 48 = 24$.

7. (c) 1 : 4

Reason: The four triangles formed by joining midpoints of a triangle are equal in area.

8. (b) 40 cm^2

Reason: $\triangle AQS$ and $PQRS$ are on the same base QS (diagonal) and between same parallels? No. In this figure, $\text{Area}(\triangle AQS) = \frac{1}{2} \text{Area}(PQRS)$ because it shares the same base QS and vertex A is on a line parallel to the diagonal.

Section B: Very Short Answer Questions

1. **Solution:** Triangles $\triangle ABD$, $\triangle ADE$, $\triangle AEC$ have equal bases ($BD = DE = EC$) and share the same vertex A (thus the same altitude). $\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$, hence areas are equal.

2. **Solution:** $\text{Area}(\triangle PQT) = \frac{1}{2} \times PQ \times PT$. Since T is midpoint of PS , $PT = \frac{1}{2}PS$. $\text{Area}(\triangle PQT) = \frac{1}{2} \times PQ \times (\frac{1}{2}PS) = \frac{1}{4} \text{Area}(PQRS)$. Ratio is 1 : 4.

3. **Proof:** Diagonals d_1, d_2 of a rhombus bisect at 90° . Rhombus consists of 2 triangles on base d_1 with heights $d_2/2$. $\text{Area} = 2 \times [\frac{1}{2} \times d_1 \times \frac{d_2}{2}] = \frac{1}{2}d_1d_2$.

4. **Proof:** Join AE and produce to meet DC produced at F . Show $\triangle ABE \cong \triangle FCE$. Then $\text{Area}(ABCD) = \text{Area}(\triangle ADF)$. Since E is midpoint of AF , DE is median. $\therefore \text{Area}(\triangle ADE) = \frac{1}{2} \text{Area}(\triangle ADF) = \frac{1}{2} \text{Area}(ABCD)$.

Section C: Short Answer Questions

1. **Proof:** $Area(OAB) = Area(OC D)$. Adding $Area(OBC)$ to both sides: $Area(ABC) = Area(DBC)$. Since they share base BC and have equal areas, $AD \parallel BC$. Thus, it is a trapezium.
2. **Proof:** Join CD . $Area(\triangle BCD) = \frac{1}{2}Area(\triangle ABC)$ (median CD). $\triangle PDQ$ and $\triangle PDC$ have same base PD and $PD \parallel CQ$. $\therefore Area(PDQ) = Area(PDC)$. $Area(BPQ) = Area(BPD) + Area(PDQ) = Area(BPD) + Area(PDC) = Area(BCD) = \frac{1}{2}Area(ABC)$.
3. **Proof:** Joining midpoints D, E, F creates 4 congruent triangles (ADF, BDE, CEF, DEF) by Midpoint Theorem. Thus $Area(DEF) = \frac{1}{4}Area(ABC)$.

Section D: Long Answer Questions

1. **Proof:** In $ALCM$, $AL \parallel MC$ and $AL = MC$, so $ALCM$ is a parallelogram. Diagonals of a \parallel^{gm} bisect each other, so LM and AC bisect each other. Since $ABCD$ is a \parallel^{gm} , AC and BD also bisect each other. Thus LM and BD bisect each other. For areas: $Area(ADML) = Area(ABCD) - Area(\triangle LBC) - Area(\triangle ABM) \dots$ (Use subtraction of equal regions).
2. **Proof:** $\triangle ABC$ and $\triangle AFC$ are on base AC and $AC \parallel BF$, so $Area(ABC) = Area(AFC)$. Similarly, $Area(ADE) = Area(ADG)$. $Area(ABCDE) = Area(ABC) + Area(ACD) + Area(ADE)$. Substitute: $Area(AFC) + Area(ACD) + Area(ADG) = Area(\triangle AFG)$.

Section E: Case Study Based Questions

1. (b) $1200 m^2$ ($Area(\triangle APB) = \frac{1}{2}Area(ABCD)$).
2. (a) $1200 m^2$ ($Area_{Wheat} = Area_{Total} - Area_{Pulses} = 2400 - 1200$).
3. (b) **1 : 1** (Both triangles have same altitude and equal bases $DP = PC$).
4. (c) **Remain the same** (Base AB and height remain constant).
5. (c) **Triangle and parallelogram on same base and between same parallels.**