



Nets and surface area

GRADE 6 MATH

Answer keys for the exit ticket, practice worksheet, and homework, plus notes for the lesson slides. Each answer shows the steps and the most likely wrong answer (“If wrong”), so you can tell what a mistake means, not just that it is one. Questions go from **fluency** to **application** to **reasoning**.

Exit Ticket — answer key

Use: End of the surface-area lesson and of the G6 Geometry domain. 5–8 min, independent. Item 4 deliberately re-tests G-02.

Timing: 5–8 min · independent. An answer of 26 on item 2 means faces are being counted once, not in pairs.

1. Cube with edge 3? **FLUENCY**

Answer: **54 square units**

1. Each face is $3 \times 3 = 9$ square units.
2. A cube has 6 faces: $6 \times 9 = 54$ square units.

If wrong: Answered 27 — that is the VOLUME ($3 \times 3 \times 3$), not the surface area.

2. Prism $4 \times 3 \times 2$? **APPLICATION**

Answer: **52 square units**

1. Faces come in matching pairs. Front/back: $4 \times 3 = 12$ each.
2. Left/right: $3 \times 2 = 6$ each. Top/bottom: $4 \times 2 = 8$ each.
3. Total: $2(12) + 2(6) + 2(8) = 24 + 12 + 16 = 52$ square units.

If wrong: Added only $12 + 6 + 8 = 26$, counting three faces instead of six. Every face has a twin on the opposite side.

3. Prism $5 \times 2 \times 6$? **APPLICATION**

Answer: **104 square units**

1. Pairs: $5 \times 2 = 10$, $5 \times 6 = 30$, $2 \times 6 = 12$.
2. $2(10) + 2(30) + 2(12) = 20 + 60 + 24 = 104$ square units.

If wrong: Answered 60 — that is the volume $5 \times 2 \times 6$.

4. Cube edge 4 — surface area and volume? REASONING

Answer: **Surface area 96 square units; volume 64 cubic units**

1. Surface area: 6 faces of $4 \times 4 = 16$, so $6 \times 16 = 96$ square units.
2. Volume: $4 \times 4 \times 4 = 64$ cubic units.
3. Surface area is the WRAPPING — how much paper you would need to cover it. Two directions at a time, so square units.
4. Volume is the FILLING — how much would fit inside. Three directions at once, so cubic units.
5. They are different measurements of the same object and cannot be compared.

If wrong: Said one answer must be bigger, or used the same units for both. The unit is the clearest signal of which quantity you found.

Quick answers for fast checking:

#	Level	Answer
1	fluency	54 square units
2	application	52 square units
3	application	104 square units
4	reasoning	96 sq units; 64 cubic units

Practice Worksheet — answer key

Use: During the lesson after the deck. Item 6 breaks the 6-face habit; items 8 and 9 close the domain by forcing the volume/surface-area distinction and a reverse problem.

Timing: 15–25 min · pairs or independent · circulate on 6 and 9. If you have paper nets, have students unfold a box before item 1 — one minute here saves ten later.

1. Cube edge 2? FLUENCY

Answer: **24 square units**

1. Each face: $2 \times 2 = 4$. Six faces: $6 \times 4 = 24$ square units.

If wrong: Answered 8 — the volume.

2. Prism $3 \times 3 \times 5$? FLUENCY

Answer: **78 square units**

1. Pairs: $3 \times 3 = 9$, $3 \times 5 = 15$, $3 \times 5 = 15$.
2. $2(9) + 2(15) + 2(15) = 18 + 30 + 30 = 78$ square units.

If wrong: Answered 39 by halving — counting each pair once.

3. Cube edge 5? FLUENCY

Answer: **150 square units**

1. $6 \times (5 \times 5) = 6 \times 25 = 150$ square units.

If wrong: Answered 125 — the volume.

4. Prism $6 \times 4 \times 2$? APPLICATION

Answer: **88 square units**

1. Pairs: $6 \times 4 = 24$, $6 \times 2 = 12$, $4 \times 2 = 8$.
2. $2(24) + 2(12) + 2(8) = 48 + 24 + 16 = 88$ square units.

If wrong: Answered 48 — the volume.

5. Prism $8 \times 3 \times 3$? APPLICATION

Answer: **114 square units**

1. Pairs: $8 \times 3 = 24$, $8 \times 3 = 24$, $3 \times 3 = 9$.
2. $2(24) + 2(24) + 2(9) = 48 + 48 + 18 = 114$ square units.

If wrong: Missed that two of the three pairs are identical here and counted 24 only once.

6. Triangular prism, ends base 6 height 4, length 10, sides 5, 5, 6? APPLICATION

Answer: **184 square units**

1. Two triangular ends: each is $(6 \times 4) \div 2 = 12$, so $2 \times 12 = 24$ square units.
2. Three rectangular faces, each 10 long: $10 \times 5 = 50$, $10 \times 5 = 50$, $10 \times 6 = 60$.
3. Rectangles total $50 + 50 + 60 = 160$ square units.
4. Surface area: $24 + 160 = 184$ square units.
5. The net has 5 faces here, not 6 — count what the net actually shows.

If wrong: Used the 6-face rule out of habit, or forgot to halve the triangular ends.

7. Student got 26 for a $4 \times 3 \times 2$ prism — correct answer and mistake? REASONING

Answer: **52 square units — the student counted 3 faces instead of 6**

1. The student found $12 + 6 + 8 = 26$, which is one of each pair.
2. A closed box has SIX faces: every face has an identical one opposite it.
3. Correct: $2(12) + 2(6) + 2(8) = 52$ square units.
4. Their answer is exactly half the true value — a reliable fingerprint for this error.

If wrong: Assumed the student found the volume. The volume would be 24, not 26; the exact halving points to the missing pairs.

8. Cube edge 3 — surface area and volume, and why different? REASONING

Answer: **Surface area 54 square units; volume 27 cubic units**

1. Surface area: $6 \times (3 \times 3) = 54$ square units.
2. Volume: $3 \times 3 \times 3 = 27$ cubic units.
3. Surface area multiplies TWO lengths at a time and adds up six faces → square units.
4. Volume multiplies THREE lengths at once → cubic units.
5. They answer different questions — how much wrapping paper, versus how much water — so there is no reason for them to match.

If wrong: Treated 54 and 27 as competing answers to one question. They answer two different questions.

9. Cube with surface area 54 — edge length? REASONING

Answer: **3 units**

1. A cube has 6 identical faces, so one face is $54 \div 6 = 9$ square units.
2. A face is a square, so the edge is the number that times itself gives 9: $3 \times 3 = 9$, so the edge is 3 units.
3. Check: $6 \times 9 = 54$ square units.

If wrong: Divided 54 by 6 and stopped at 9, giving the FACE area rather than the edge. One more step is needed.

Quick answers for fast checking:

#	Level	Answer
1	fluency	24 square units
2	fluency	78 square units
3	fluency	150 square units

4	application	88 square units
5	application	114 square units
6	application	184 square units
7	reasoning	52 square units
8	reasoning	54 sq units; 27 cubic units
9	reasoning	3 units

Homework — answer key

Use: Parallels the practice sheet and closes G6 Geometry. Item 1's coincidence (a cube of edge 6 has surface area and volume both equal to 216) is worth surfacing — it is a good reminder that a matching number is not a matching quantity.

Timing: ~15 min at home · independent · review items 1 and 7 together as the next-day warm-up.

1. Cube edge 6? FLUENCY

Answer: **216 square units**

1. $6 \times (6 \times 6) = 6 \times 36 = 216$ square units.

If wrong: Answered 216 for the volume too — coincidence here, since $6^3 = 216$ as well. Check the reasoning, not just the number.

2. Prism $5 \times 4 \times 3$? FLUENCY

Answer: **94 square units**

1. Pairs: $5 \times 4 = 20$, $5 \times 3 = 15$, $4 \times 3 = 12$.

2. $2(20) + 2(15) + 2(12) = 40 + 30 + 24 = 94$ square units.

If wrong: Answered 47 by counting each pair once.

3. Cube edge 7? FLUENCY

Answer: **294 square units**

1. $6 \times (7 \times 7) = 6 \times 49 = 294$ square units.

If wrong: Answered 343 — the volume.

4. Prism $7 \times 2 \times 4$? APPLICATION

Answer: **100 square units**

1. Pairs: $7 \times 2 = 14$, $7 \times 4 = 28$, $2 \times 4 = 8$.
2. $2(14) + 2(28) + 2(8) = 28 + 56 + 16 = 100$ square units.

If wrong: Answered 56 — the volume.

5. Prism $9 \times 5 \times 2$? APPLICATION

Answer: **146 square units**

1. Pairs: $9 \times 5 = 45$, $9 \times 2 = 18$, $5 \times 2 = 10$.
2. $2(45) + 2(18) + 2(10) = 90 + 36 + 20 = 146$ square units.

If wrong: Answered 90 — the volume.

6. Triangular prism, ends base 8 height 3, length 12, sides 5, 5, 8? APPLICATION

Answer: **240 square units**

1. Two triangular ends: each $(8 \times 3) \div 2 = 12$, so $2 \times 12 = 24$ square units.
2. Three rectangles, each 12 long: $12 \times 5 = 60$, $12 \times 5 = 60$, $12 \times 8 = 96$.
3. Rectangles total $60 + 60 + 96 = 216$ square units.
4. Surface area: $24 + 216 = 240$ square units.

If wrong: Forgot the two triangular ends, giving 216, or forgot to halve them.

7. Cube edge 2 — surface area and volume, and why different? REASONING

Answer: **Surface area 24 square units; volume 8 cubic units**

1. Surface area: $6 \times (2 \times 2) = 24$ square units.
2. Volume: $2 \times 2 \times 2 = 8$ cubic units.
3. Surface area covers the outside — two lengths at a time, six times over → square units.
4. Volume fills the inside — three lengths at once → cubic units.
5. Here the surface area number is larger, but that is not a rule; for a cube with edge 10 the volume number is larger. The quantities are not comparable.

If wrong: Concluded that surface area is always the larger number. That happens only for small solids.

8. Cube with surface area 150 — edge length? REASONING

Answer: **5 units**

1. One face: $150 \div 6 = 25$ square units.
2. A face is a square, so the edge times itself is 25 $\rightarrow$ the edge is 5 units.
3. Check: $6 \times 25 = 150$ square units.

If wrong: Stopped at 25, reporting the face area rather than the edge length.

Quick answers for fast checking:

#	Level	Answer
1	fluency	216 square units
2	fluency	94 square units
3	fluency	294 square units
4	application	100 square units
5	application	146 square units
6	application	240 square units
7	reasoning	24 sq units; 8 cubic units
8	reasoning	5 units

Lesson slides — teaching notes & timing

Mini-lesson deck: ~12–15 min, then the practice sheet. Closes the G6 Geometry domain. A physical box to unfold is the single highest-value prop for this lesson.

Slide	~Time	Note
1/8	0:00	Frame it: surface area is a covering question, so unfolding turns it into an area problem you already know.
2/8	1:00	Hook — poll 27 vs 54. Do NOT resolve. Students fresh from G-02 reach for volume automatically.
3/8	3:00	Unfold an actual box here if you have one. The net stops being abstract the moment they see it lie flat.
4/8	5:00	WE1 — resolve the hook. Name 27 explicitly as the volume so the distinction is stated, not implied.
5/8	7:00	WE2 — the three pairs. Teach the diagnostic: exactly half the answer means three faces were counted.
6/8	9:30	CFU — all-student response. Answer 52 square units. Watch for 26 and for 24 (the volume).
7/8	11:30	Close the domain. The triangular prism on the practice sheet has five faces, so ‘always six’ is a habit worth breaking now.
8/8	13:30	Launch the in-class practice sheet.