Estimation in Number Operations

Unit: Knowing Our Numbers - Student Practice Worksheet

Overview: Ms. Rao gave the class ten seconds to say whether 512 x 48 was closer to 20,000 or 30,000, no pencils allowed. Kabir, who could multiply exactly on paper in two minutes, was still stuck when time ran out. Anaya, who rounded first, called "25,000-ish" in three seconds — and the real answer was 24,576.

Practice Questions (30 Total)

Section A - Easy

Q1. The number line marks 47 between 40 and 50. Rounded to the nearest ten, which end-mark is closer?

- ☐ **A.** 40
- ☐ **B.** 50
- ☐ **C.** 45
- ☐ **D.** 100

Q2. What does estimation mainly trade away for speed?

- ☐ **A.** Exactness
- ☐ **B.** Numbers
- ☐ **C.** Addition
- ☐ **D.** Zero

Q3. 23 rounded to the nearest ten is:

- ☐ **A.** 30
- ☐ **B.** 25
- ☐ **C.** 20
- ☐ **D.** 10

Q4. The number line marks 651 between 600 and 700, with 650 as the midpoint. Rounded to the nearest hundred, which end-mark wins?

- [ ] **A.** 700
- [ ] **B.** 600
- [ ] **C.** 650
- [ ] **D.** 500

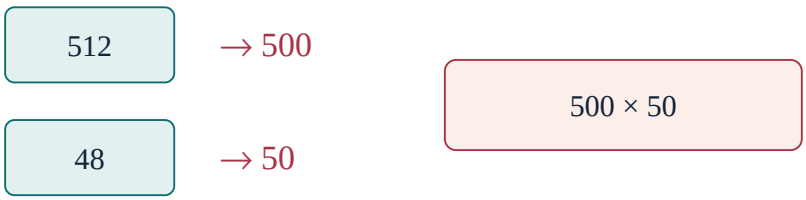
Q5. Which is the best reason to estimate instead of calculate exactly?

- [ ] **A.** You always need perfect precision
- [ ] **B.** Estimates are always exactly right
- [ ] **C.** Calculators cannot round
- [ ] **D.** You need a fast, rough check

Q6. In Anaya's estimate, 48 was rounded to which number?

- [ ] **A.** 40
- [ ] **B.** 45
- [ ] **C.** 50
- [ ] **D.** 100

Q7. The flow chart rounds 512 and 48, then multiplies the round numbers. What estimate does it produce?



- [ ] **A.** 20,000
- [ ] **B.** 25,000
- [ ] **C.** 24,576

- [ ] **D.** 50,000

Q8. Is an estimate ever exactly equal to the real answer?

- [ ] **A.** Never
- [ ] **B.** Only for fractions
- [ ] **C.** Only for negative numbers
- [ ] **D.** Sometimes, yes

Q9. In Anaya's estimate, 512 was rounded to which number?

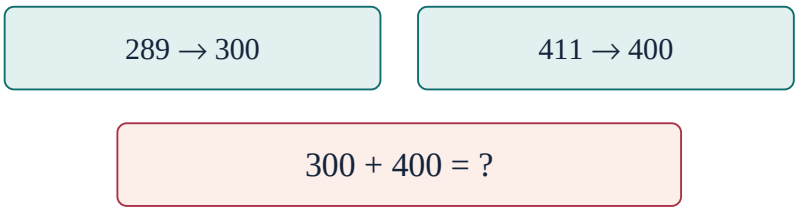
- [ ] **A.** 520
- [ ] **B.** 500
- [ ] **C.** 510
- [ ] **D.** 600

Q10. Which scenario is best suited to an estimate rather than an exact answer?

- [ ] **A.** Writing an exact receipt total
- [ ] **B.** Quickly checking if you have enough money while shopping
- [ ] **C.** Filling in a bank form
- [ ] **D.** Recording an exact scientific measurement

Section B - Medium

Q11. The diagram rounds 289 and 411 to the nearest hundred, then adds. What estimate should fill the bottom box?



- [ ] **A.** 700
- [ ] **B.** 600
- [ ] **C.** 800
- [ ] **D.** 650

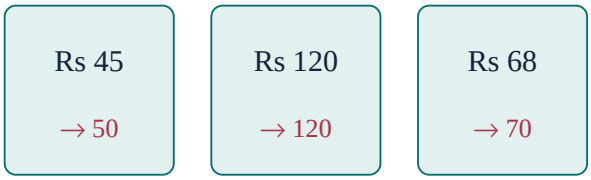
Q12. Which rounded pair gives the fastest but still reasonably close estimate of 613 × 19?

- [ ] **A.** 613 × 19 exactly
- [ ] **B.** 700 × 10
- [ ] **C.** 600 × 20
- [ ] **D.** 500 × 30

Q13. Estimate 78 × 22 by rounding each number to the nearest ten.

- [ ] **A.** 1400
- [ ] **B.** 1600
- [ ] **C.** 1500
- [ ] **D.** 1800

Q14. The three price cards show nearest-ten rounding. What is the estimated bill?



Nearest-ten estimate of the bill

- [ ] **A.** About Rs 200
- [ ] **B.** About Rs 180
- [ ] **C.** About Rs 300
- [ ] **D.** About Rs 240

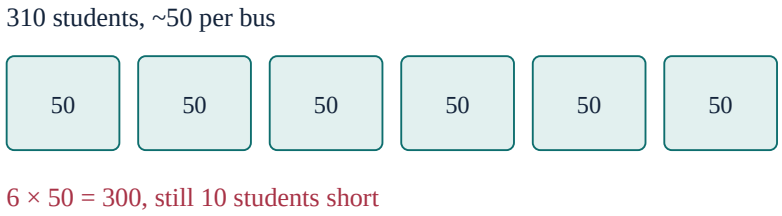
Q15. Which is the most sensible way to estimate 9 × 812?

- [ ] **A.** 10 × 800 = 8000
- [ ] **B.** 9 × 1000 = 9000
- [ ] **C.** 10 × 812 = 8120
- [ ] **D.** 9 × 800 = 7200

Q16. Kabir estimates 4998 + 3021 as 5000 + 3000 = 8000. How close is this to the exact answer?

- [ ] **A.** Off by about 1000
- [ ] **B.** Off by about 19
- [ ] **C.** Exactly equal
- [ ] **D.** Off by about 500

Q17. The six bus boxes hold about 50 students each. Using that picture, what is the best next step after estimating 6 buses for 310 students?



- [ ] **A.** Just guess a random number
- [ ] **B.** Round 310 down to 300 and ignore the rest
- [ ] **C.** Use 300/50 = 6 buses, then check it covers everyone
- [ ] **D.** Assume exactly 7 buses without checking

Q18. Estimating is most risky when a number is close to the exact midpoint between two round values (like 45, between 40 and 50). Why?

- [ ] **A.** Because rounding rules can push it either way with equal reasoning, changing the estimate's size
- [ ] **B.** Because midpoint numbers cannot be rounded at all
- [ ] **C.** Because midpoint numbers are always rounded down
- [ ] **D.** Because it makes the calculation impossible

Q19. Which of these is the estimate closest to the true value of 197 × 51?

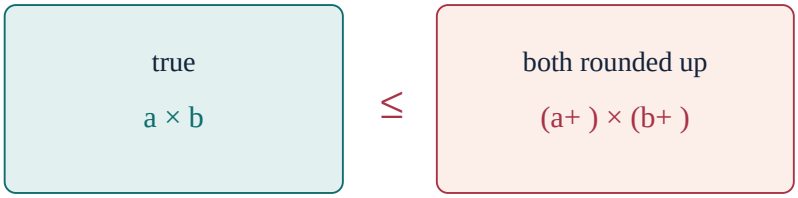
- [ ] **A.** 200 × 100 = 20,000
- [ ] **B.** 150 × 50 = 7,500
- [ ] **C.** 197 × 100 = 19,700
- [ ] **D.** 200 × 50 = 10,000

Q20. Which situation shows estimation being used correctly as a CHECK, not a replacement?

- [ ] **A.** Never calculating exactly, only ever estimating
- [ ] **B.** Calculating exactly, then comparing to a rounded estimate to catch mistakes
- [ ] **C.** Writing the estimate on an official receipt instead of the exact total
- [ ] **D.** Ignoring the exact answer once an estimate is found

Section C - Challenge

Q21. The diagram compares a true product a×b with both factors rounded UP. What is guaranteed about the right-hand product?



- [ ] **A.** It will always be greater than or equal to the true product
- [ ] **B.** It will always be less than or equal to the true product
- [ ] **C.** It could be either, with no pattern
- [ ] **D.** It will always equal the true product exactly

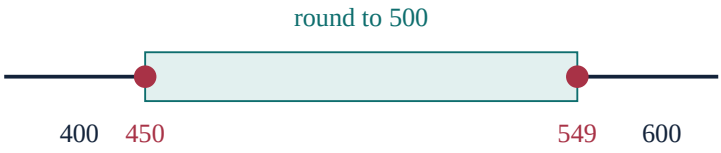
Q22. Estimating 512 × 48 as 500 × 50 rounds one number down and one up. Why might this land closer to the truth than rounding both up or both down?

- [ ] **A.** Because it is a coincidence with no general reason
- [ ] **B.** Because rounding in opposite directions partly cancels the two errors
- [ ] **C.** Because opposite-direction rounding always gives the exact answer
- [ ] **D.** Because one number being rounded down makes multiplication invalid

Q23. An estimate of a sum is 8000, and the true sum is between 7950 and 8050. If a third number, exactly 8100, is compared to this estimate, what can you conclude?

- [ ] **A.** 8100 is definitely smaller than the true sum
- [ ] **B.** 8100 equals the true sum
- [ ] **C.** 8100 is definitely larger than the true sum
- [ ] **D.** Nothing can be concluded

Q24. The shaded band shows every number that rounds to 500 at the nearest hundred. What is the full range of that band?



- [ ] **A.** 450 to 549
- [ ] **B.** 400 to 500

- [ ] **C.** 500 to 600
- [ ] **D.** 490 to 510

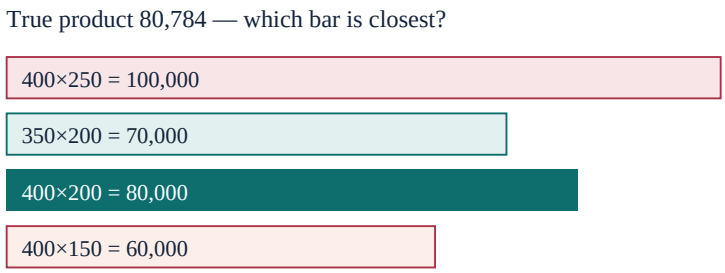
Q25. Ms. Rao says estimation is more reliable for addition than for multiplication when both numbers are rounded the same direction. Why might multiplication's estimate drift further off?

- [ ] **A.** Because multiplication has no rounding rule at all
- [ ] **B.** Because multiplication always rounds to zero
- [ ] **C.** There is no real difference between the two
- [ ] **D.** Because rounding errors in multiplication multiply together, compounding the drift, while addition errors simply add

Q26. Kabir estimates a bill as Rs 1200, rounding two items up and one item down. The true bill turns out to be Rs 1250. What does this tell you about his estimate?

- [ ] **A.** His estimate must be wrong since he rounded some items up
- [ ] **B.** His estimate happened to undershoot the true total despite rounding some items up
- [ ] **C.** The true bill must actually be Rs 1200
- [ ] **D.** Rounding up always overshoots the total

Q27. The four bars compare estimates of 396 × 204 with the true product 80,784. Which estimate is closest?



- [ ] **A.** 400 × 250 = 100,000
- [ ] **B.** 350 × 200 = 70,000
- [ ] **C.** 400 × 200 = 80,000
- [ ] **D.** 400 × 150 = 60,000

Q28. Anaya says an estimate can never replace an exact answer when money must be paid down to the last rupee. Is there ever an exception to this?

- [ ] **A.** Yes, estimates are always accurate enough for payments
- [ ] **B.** Yes, but only for round numbers

- [ ] **C.** Yes, if the shopkeeper agrees to it
- [ ] **D.** No, exact payment always needs an exact calculation, not an estimate

Q29. A rounded estimate for a total is 6000, but you know the true total is definitely larger than the estimate because both numbers were rounded down. What can you say about the true total?

- [ ] **A.** It is at least 6000, and probably a bit more
- [ ] **B.** It is definitely exactly 6000
- [ ] **C.** It is less than 6000
- [ ] **D.** Nothing can be said about it

Q30. Which strategy would give the MOST accurate quick estimate of 6789 × 3?

- [ ] **A.** 6000 × 3 = 18,000
- [ ] **B.** 7000 × 3 = 21,000
- [ ] **C.** 7000 × 5 = 35,000
- [ ] **D.** 6800 × 5 = 34,000

Answer Key

Q1: (B) (b) 50. The red mark at 47 sits nearer 50 than 40, because 7 is past the halfway digit 5.

Q2: (A) (a) Exactness. Estimation rounds numbers to make the calculation faster, at the cost of not being perfectly precise.

Q3: (C) (c) 20. 23 is closer to 20 than to 30, since 3 rounds down.

Q4: (A) (a) 700. 651 sits just past the midpoint 650, so it rounds up to 700. (648 would still round down to 600.)

Q5: (D) (d) You need a fast, rough check. Estimation trades precision for speed, which is ideal when a quick sanity check is all that's needed.

Q6: (C) (c) 50. 48 rounds up to 50, the nearest ten, since 8 rounds up.

Q7: (B) (b) 25,000. The chart shows 512 → 500 and 48 → 50, and 500 × 50 = 25,000. 24,576 is the exact product, not the estimate.

Q8: (D) (d) Sometimes, yes. Kabir's estimate of 289+411 rounding to 700 matched the exact total exactly — rounding can sometimes land right on the true answer.

Q9: (B) (b) 500. Anaya rounded 512 down to the nearest hundred, 500, to make the multiplication easy.

Q10: (B) (b) Quickly checking if you have enough money while shopping. This needs a fast rough answer, not exact precision, which is exactly what estimation is for.

Q11: (A) (a) 700. The boxes show 289 → 300 and 411 → 400, and 300+400=700 — which happens to match the exact answer too.

Q12: (C) (c) 600 × 20. Rounding both numbers to their nearest convenient values (600 and 20) gives 12,000, very close to the true 11,647, while staying easy to multiply mentally.

Q13: (B) (b) 1600. 78 rounds to 80 and 22 rounds to 20, and 80×20=1600, a close estimate of the real answer, 1716.

Q14: (D) (d) About Rs 240. The cards round to 50+120+70=240. The exact total is 233 — a useful quick check before paying. (An earlier key that said 230 did not match the rounded sum.)

Q15: (A) (a) 10 × 800 = 8000. Rounding 9 up to 10 and 812 down to 800 gives a fast, close estimate of the true value 7,308; the other options round only one number or round too far.

Q16: (B) (b) Off by about 19. The exact sum is 8019, so the rounded estimate 8000 is only 19 away — an excellent estimate for such large numbers.

Q17: (C) (c) Use 300/50 = 6 buses, then check it covers everyone. The picture's caption already shows 6×50=300, still 10 short — so the estimate is a start, and 7 buses are really needed (6×45=270 is also short).

Q18: (A) (a) Because rounding rules can push it either way with equal reasoning, changing the estimate's size. A number exactly at the midpoint has the loosest connection to either round value, so the estimate carries slightly more uncertainty there.

Q19: (D) (d) 200 × 50 = 10,000. Rounding both numbers to their nearest convenient value gives an estimate very close to the true 10,047.

Q20: (B) (b) Calculating exactly, then comparing to a rounded estimate to catch mistakes. This is exactly how Ms. Rao used Anaya's estimate — as a quick sanity check against the real calculation, not instead of it.

Q21: (A) (a) It will always be greater than or equal to the true product. Rounding both factors up means each rounded value is at least as large as the original, so their product cannot be smaller than the true one.

Q22: (B) (b) Because rounding in opposite directions partly cancels the two errors. Rounding one factor down and the other up tends to offset the individual rounding errors, often landing closer to the true product than rounding both the same way.

Q23: (C) (c) 8100 is definitely larger than the true sum. Since the true sum is at most 8050, and 8100 exceeds even that upper bound, it must be larger than the actual value — exactly the kind of sanity check estimation is built for.

Q24: (A) (a) 450 to 549. The band runs from the midpoint 450 (which rounds up) through 549, the last whole number before 550 pulls the rounding to 600.

Q25: (D) (d) Because rounding errors in multiplication multiply together, compounding the drift, while addition errors simply add. Two small rounding errors combine multiplicatively in a product, which can grow the gap faster than the same errors would in a sum.

Q26: (B) (b) His estimate happened to undershoot the true total despite rounding some items up. Mixed rounding directions do not guarantee the overall estimate lands above or below the truth — the one item rounded down evidently outweighed the two rounded up.

Q27: (C) (c) 400 × 200 = 80,000. The filled bar nearest the true size is 400×200; rounding each factor to its own nearest hundred stays within a thousand of 80,784.

Q28: (D) (d) No, exact payment always needs an exact calculation, not an estimate. By definition an estimate only approximates the true value, so any situation requiring the last-rupee precision (like a bill) genuinely needs the exact calculation, not a rounded guess.

Q29: (A) (a) It is at least 6000, and probably a bit more. Rounding both numbers down before adding means the estimate underestimates the true total, so the real value must be at or above the rounded figure.

Q30: (B) (b) 7000 × 3 = 21,000. Rounding only the large number to its nearest thousand, while leaving the already-simple single digit 3 unchanged, gives the estimate closest to the true value 20,367 — the other options round the small number too, gaining nothing but losing accuracy.

You've got this! Keep learning and shining! - Ruchi Math Coaching