

Force, Friction, Pressure and Sound

Science · Class 8 · Topic-wise Practice Worksheet

TIME 45 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ___ / 24
--------------------	-----------------	-------------------	------------------------

Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Study every diagram and table carefully.

Section A — Scientific Reasoning

Q1–Q8 · 1 mark each

- The SI unit of force is the _____.
 (A) Newton (B) Joule
 (C) Pascal (D) Watt
- Force per unit area is called _____.
 (A) Thrust (B) Power
 (C) Work (D) Pressure
- Which of these is a **non-contact** force?
 (A) Gravitational force (B) Friction
 (C) Muscular force (D) Force applied while pushing a box
- Which type of friction is the **smallest**?
 (A) Static friction (B) Rolling friction
 (C) Sliding friction (D) All are equal
- Sound is produced by objects that are _____.
 (A) Hot (B) Charged
 (C) Vibrating (D) Magnetised
- Sound cannot travel through _____.
 (A) Solids (B) Liquids
 (C) Gases (D) A vacuum
- The **loudness** of a sound depends on the _____ of the vibration.
 (A) Amplitude (B) Frequency
 (C) Speed (D) Wavelength
- The number of vibrations per second is called the _____, and is measured in hertz.
 (A) Amplitude (B) Frequency
 (C) Time period (D) Loudness

9. A force of 200 N acts on an area of 0.5 m^2 . What is the pressure?
- (A) 100 Pa (B) 200 Pa
(C) 400 Pa (D) 1,000 Pa
10. Why is the cutting edge of a knife made very thin?
- (A) To make it lighter (B) To reduce friction
(C) To make it look sharp (D) A smaller area under the same force gives a much greater pressure, so it cuts easily
11. Why do camels have broad, flat feet?
- (A) To spread their weight over a larger area, so the pressure on the sand is less and they do not sink (B) To run faster
(C) To keep cool (D) To store water
12. In the table below, which row is **incorrectly** matched?

Row	Situation	Friction
(A)	Oiling a squeaky hinge	Reduces friction
(B)	Treads on a tyre	Increase friction
(C)	Ball bearings in a machine	Increase friction
(D)	Chalk powder on hands of a gymnast	Increases friction

Table 12.1 — Friction in everyday life

- (A) Row (A) (B) Row (B)
(C) Row (C) (D) Row (D)
13. Why is it difficult to walk on a smooth wet floor?
- (A) The floor is too hard (B) The water reduces the friction between the shoes and the floor
(C) Gravity is weaker on wet floors (D) Wet floors are colder
14. A boy hears an echo of his shout from a distant cliff 3 seconds later. Taking the speed of sound as 340 m/s, how far away is the cliff?
- (A) 340 m (B) 1,020 m
(C) 510 m (D) 2,040 m
15. Why does the sound of a mosquito seem shrill while that of a lion's roar seems deep?
- (A) The mosquito is louder (B) The mosquito vibrates with a greater amplitude
(C) The lion is closer (D) The mosquito's wings vibrate at a much higher frequency, giving a higher pitch

16. Consider the following statements.

- (i) Friction is always undesirable and should be removed completely.
- (ii) Liquids exert pressure on the walls of their container as well as on the base.
- (iii) Sound travels faster in solids than in air.

Which of the statements is/are correct?

- (A) (i) and (ii) only
- (B) (ii) and (iii) only
- (C) (i) and (iii) only
- (D) All three

17. A brick is placed on sand first on its largest face and then on its smallest face. In which position does it sink deeper, and why?

- (A) On the smallest face, because the same weight acts on a smaller area, giving greater pressure
- (B) On the largest face, because the weight increases
- (C) Equally in both, because the weight is the same
- (D) It never sinks

18. A sound of frequency 500 Hz travels through air at 340 m/s. Explain why the same sound arrives sooner through a steel rail than through the air.

- (A) Its frequency increases in steel
- (B) The closely packed particles of a solid pass the vibration on much faster, so the speed of sound is higher in steel
- (C) Steel is magnetic
- (D) Sound does not travel through steel

Answer Key

1	A	2	D	3	A	4	B	5	C
6	D	7	A	8	B	9	C	10	D
11	A	12	C	13	B	14	C	15	D
16	B	17	A	18	B				

Solutions

1. Answer: (A) Newton

Force is measured in **newtons** (N). The joule is the unit of energy, the pascal of pressure and the watt of power.

2. Answer: (D) Pressure

Pressure = force ÷ area, and its SI unit is the pascal (Pa), which is one newton per square metre.

3. Answer: (A) Gravitational force

Gravitational force acts without the two bodies touching, so it is a non-contact force. Magnetic and electrostatic forces are the other common examples.

4. Answer: (B) Rolling friction

Rolling friction is smaller than sliding friction, which is in turn smaller than static friction. This is why heavy luggage is fitted with wheels and ball bearings are used in machines.

5. Answer: (C) Vibrating

Every sound is produced by a **vibrating** object — the stretched skin of a drum, a guitar string or the vocal cords. Stop the vibration and the sound stops.

6. Answer: (D) A vacuum

Sound needs a material medium whose particles can vibrate and pass the disturbance on. **A vacuum** has no particles, so sound cannot travel through it — which is why space is silent.

7. Answer: (A) Amplitude

Loudness depends on the **amplitude** — the size of the vibration. Striking a drum harder increases the amplitude and the loudness. Frequency determines pitch instead.

8. Answer: (B) Frequency

Frequency is the number of oscillations per second, measured in hertz (Hz). A higher frequency means a shriller sound, that is a higher pitch.

9. Answer: (C) 400 Pa

Pressure = force ÷ area
= $200 \div 0.5 = 400 \text{ Pa}$.

10. Answer: (D) A smaller area under the same force gives a much greater pressure, so it cuts easily

Pressure = force ÷ area, so for a given push, **a smaller contact area produces a far greater pressure**. This is why a sharp knife cuts easily and why nails and pins are pointed.

11. Answer: (A) To spread their weight over a larger area, so the pressure on the sand is less and they do not sink

A larger contact area means a smaller pressure for the same weight. Broad feet **spread the camel's weight over a larger area**, so it does not sink into soft sand. Tractors have wide tyres for the same reason.

12. Answer: (C) Row (C)

Ball bearings replace sliding friction with much smaller **rolling friction**, so they **reduce** friction, not increase it. The other three rows are correct.

13. Answer: (B) The water reduces the friction between the shoes and the floor

Walking depends on friction to grip the ground. **Water fills the tiny irregularities and acts as a lubricant, reducing friction**, so the foot slips. This is why bathroom floors have rough tiles.

14. Answer: (C) 510 m

The sound travels to the cliff **and back**, so the total distance covered is $340 \times 3 = 1,020 \text{ m}$.
The cliff is half of that away: $1,020 \div 2 = 510 \text{ m}$.

- 15. Answer: (D)** The mosquito's wings vibrate at a much higher frequency, giving a higher pitch
Pitch depends on frequency. **A mosquito's wings vibrate hundreds of times a second, giving a high frequency and therefore a shrill, high-pitched sound**, while a lion's vocal cords vibrate far more slowly, giving a deep sound. Loudness, which depends on amplitude, is a separate matter.
- 16. Answer: (B)** (ii) and (iii) only
Statement (i) is false — without friction we could not walk, write, hold objects or apply brakes, so it is useful as well as wasteful. Statement (ii) is true; this is why a hole low in a tank squirts water sideways. Statement (iii) is true, because the particles of a solid are packed closely and pass the vibration on quickly. Hence **(ii) and (iii)**.
- 17. Answer: (A)** On the smallest face, because the same weight acts on a smaller area, giving greater pressure
The brick's weight is the same in both positions, so the force is unchanged. But $\text{pressure} = \text{force} \div \text{area}$, so standing it on the **smallest face concentrates the same weight on a much smaller area, giving a far greater pressure** — and it sinks deeper. This is the classic demonstration that pressure depends on area.
- 18. Answer: (B)** The closely packed particles of a solid pass the vibration on much faster, so the speed of sound is higher in steel
Sound travels as a disturbance passed from particle to particle. **In a solid such as steel the particles are packed very closely and are strongly bound, so the disturbance is handed on much faster** — the speed of sound in steel is roughly 5,000 m/s against 340 m/s in air. The frequency of the source does not change; only the speed does.