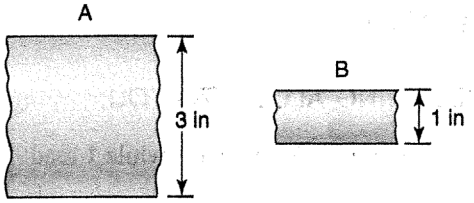
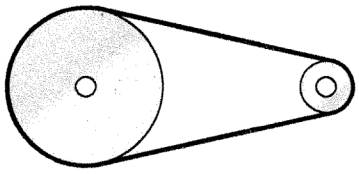
Mechanical Reasoning Practice Tests

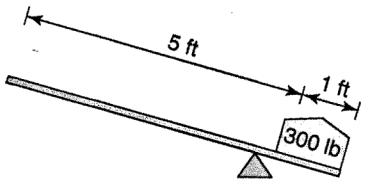
Mechanical Reasoning Test 1



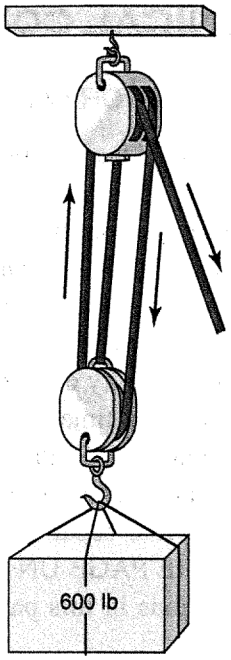
1. Pipes A and B are carrying water with the same amount of water pressure. Pipe A is carrying how much more water than pipe B?
   A. Ten times as much
   B. Nine times as much
   C. Three times as much
   D. Two times as much



2. Pulleys A and B run on the same belt. Which pulley is rotating faster?
   A. Pulley A and pulley B rotate at the same rate.
   B. Pulley A rotates faster.
   C. Pulley B rotates faster.
   D. First pulley A rotates faster, then pulley B rotates faster.

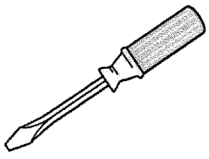


3. The lever shown is used to lift a 300-lb weight. What force is needed to lift the weight?
   A. 60 lb
   B. 50 lb
   C. 45 lb
   D. 30 lb

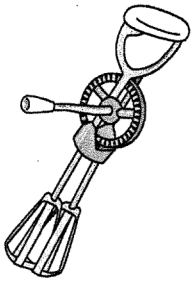


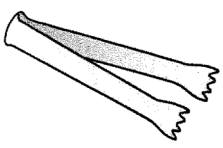
4. The rope shown must be able to lift at least
   A. 150 lb
   B. 200 lb
   C. 300 lb
   D. 1,200 lb

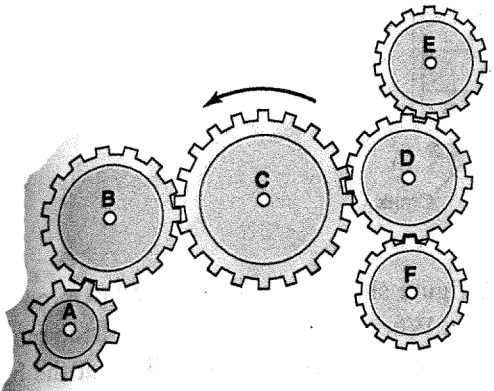
5. Which of the following is a type of lever?

A. 

B. 

C. 

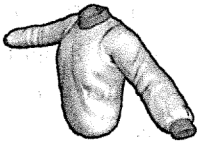
D. 

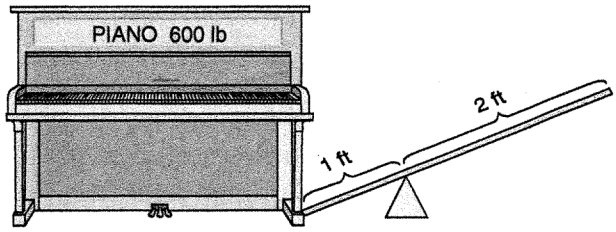


6. In the gear system shown, gear C is rotating in the direction shown. Which other gears are rotating in the same direction?
   A. A and D
   B. B, D, and F
   C. B and E
   D. A, E, and F

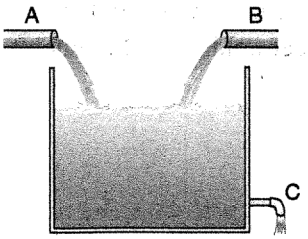
7. In a pulley system, the easiest way to find the theoretical mechanical advantage is to
   A. count the supporting strands.
   B. count the pulleys.
   C. count the number of rope strands you see.
   D. measure effort and load.

8. Gear A, with 24 teeth, is meshed with gear B, with 12 teeth. For every complete rotation of gear B, how many complete rotations will gear A make?
   A. ½
   B. 1
   C. 2
   D. 4

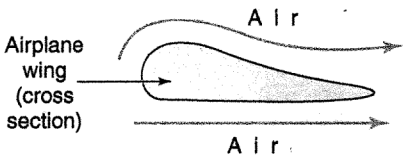
9. If all these items are the same temperature, which one will feel coldest to the touch?
   A. 
   B. 
   C. 
   D. 



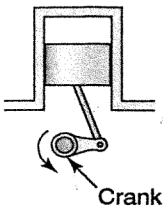
10. To lift one side of the piano, how much force must be applied to the lever?
    A. 150 lb
    B. 200 lb
    C. 250 lb
    D. 300 lb



11. Water is flowing into the tank through pipe A at 6 gallons per minute and through pipe B at 7 gallons per minute. It is flowing out of the tank through pipe C at 8 gallons per minute. How much more water will be in the tank at the end of 5 minutes?
    A. 13 gallons
    B. 15 gallons
    C. 21 gallons
    D. 25 gallons

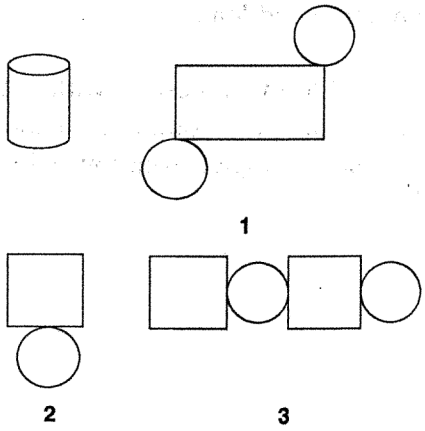


12. The diagram shows a cross section of an airplane wing in flight, with air passing above and beneath it. Lift is created because
    A. air pressure above the wing is less than air pressure below the wing.
    B. air pressure above the wing is equal to air pressure below the wing.
    C. the wing pushes air down, and the opposing force lifts the plane.
    D. air pressure above the wing is greater than air pressure below the wing.

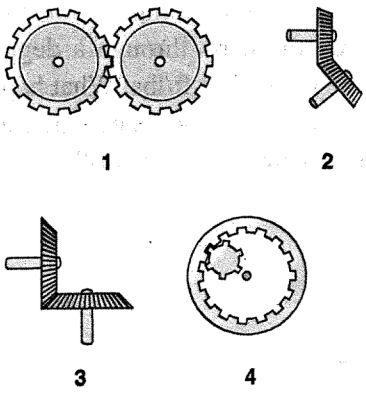


13. The figure shows a crank attached to a rod and piston. When the crank turns, the piston moves in the cylinder. The piston will be at the base of the cylinder if the crank makes a
    A. ¼ turn
    B. ½ turn
    C. ¾ turn
    D. complete turn

14. A tank 4 feet wide by 4 feet long holds 800 lb of water. What is the water pressure at the bottom in lb/ft^2?
    A. 10
    B. 12.5
    C. 25
    D. 50



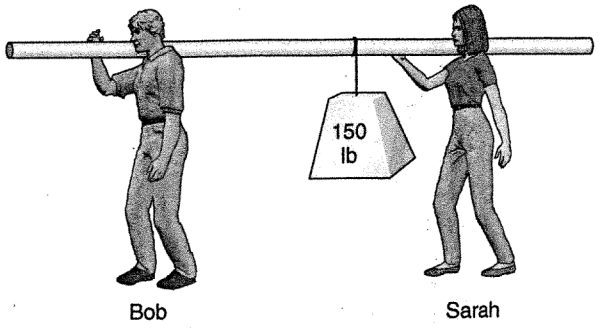
15. The flat sheet metal pattern that can be bent to form the completely closed cylinder shown is
    A. 1
    B. 2
    C. 3
    D. None of the Above



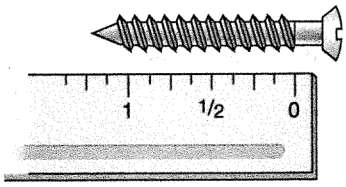
16. Which of the gear types shown is used to transmit motion between shafts that form a 90° angle?
    A. 1
    B. 2
    C. 3
    D. 4

17. If gear A and gear B are meshed, and gear B rotates twice as fast as gear A, the gear ratio of A:B is
    A. 2:1
    B. 1:1
    C. 0.5:1
    D. 1:2

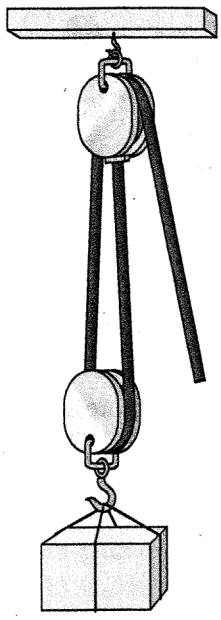
18. Oxygen gas stored in a metal cylinder exerts a pressure of 6 pounds per square inch on the inside of the cylinder. If you pump additional oxygen into the cylinder, which of the following could be the new pressure inside the cylinder?
    A. 4 pounds per square inch
    B. 5 pounds per square inch
    C. 6 pounds per square inch
    D. 8 pounds per square inch



19. In the diagram, who is carrying more of the load?
    A. Sarah
    B. Bob
    C. They are carrying equal loads.
    D. Sarah, then later Bob

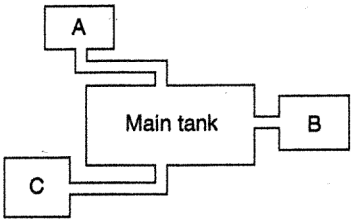


20. What happens when this screw is turned 8 complete turns tight?
    A. The screw moves in by 2/3 in.
    B. The screw moves out by 3/4 in.
    C. The screw moves in by 1/2 in.
    D. The screw moves in by 3/4 in.



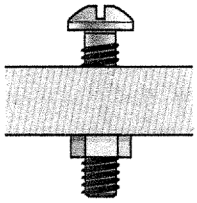
21. The mechanical advantage in the pulley system shown is
    A. 2
    B. 3
    C. 4
    D. 6

22. In the diagram, pressure in the main tank is 50 lb/in^2. What is the pressure in tank B in lb/in^2?

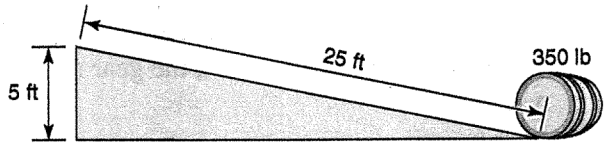


    A. 25
    B. 50
    C. 100
    D. 200

23. A nut and a bolt exert compression on this board. You run the parts through a degreaser and tighten the nut to 100 ft/lbs. What happens if you take the assembly apart, grease the threads, and retighten to 100 ft/lbs?

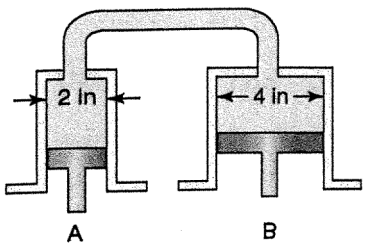


    A. Compression increases.
    B. Compression decreases.
    C. Compression does not change.
    D. Compression decreases while tightening, then increases.



24. How much effort will be needed to roll a 350-lb drum up a ramp 25 feet long and 5 feet high? (Ignore the effect of friction.)
    A. 35 lb
    B. 60 lb
    C. 70 lb
    D. 100 lb

25. In the hydraulic system shown, how much will the piston in cylinder B move when you move the piston in cylinder A by 6 inches?

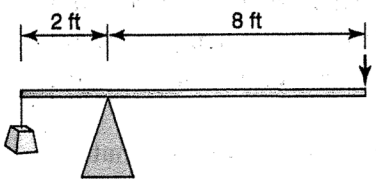


    A. 1.5 inches
    B. 2 inches
    C. 3 inches
    D. 6 inches

Mechanical Reasoning Test 2

1. A tank holds 480 gallons of fuel. If it is drained at a rate of 120 gallons per minute, it will be empty in _____ seconds.
   A. 60
   B. 120
   C. 240
   D. 480

2. If the lever balances as shown, what is the mechanical advantage?



   A. 2
   B. 3
   C. 4
   D. 8

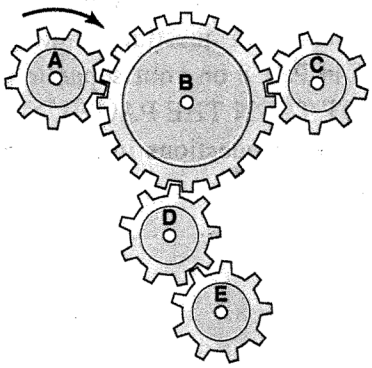
3. When a pump compresses air, the air
   A. gets hotter.
   B. gets colder.
   C. becomes a liquid.
   D. becomes a solid.

4. In a hydraulic system, the driving cylinder has a radius of 4 inches and the driven cylinder has a radius of 8 inches. The mechanical advantage is
   A. 2
   B. 4
   C. 6
   D. 8

5. For two gears to mesh properly, they must
   A. have the same number of teeth.
   B. rotate at the same speed.
   C. have teeth that are the same size.
   D. be made of the same material.

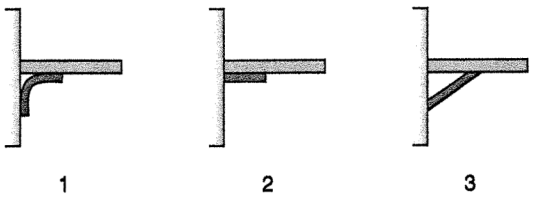
6. A screwdriver is used to turn a screw with a pitch of ¼ inch. After 10 complete turns of the screwdriver, the screw will have moved
   A. 1 inch
   B. 1 1/2 inches
   C. 2 inches
   D. 2 1/2 inches

7. Five gears are shown below. If gear A turns as shown, the other gears that turn in the same direction are



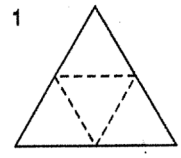
   A. Gears A and B
   B. Gears B and C
   C. Gears C and D
   D. Gears A and D

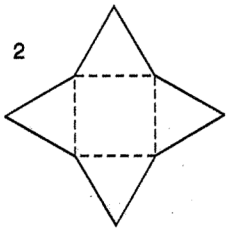
8. Which bookshelf is supported most securely?

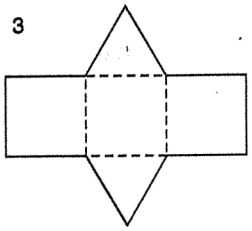


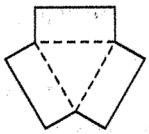
   A. 1
   B. 2
   C. 3
   D. 2 and 3 are equally secure.

9. Which flat cardboard pattern can be folded along the dotted lines to form the complete, totally enclosed, three-sided pyramid shown?







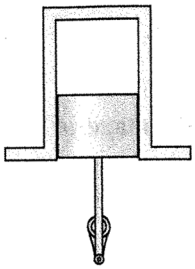


A. 1
B. 2
C. 3
D. 4

10. Which of these is not a simple machine?
A. Lever
B. Inclined plane
C. Pulley
D. Electric motor

11. A tank 2 feet wide by 6 feet long holds 600 pounds of water. What is the water pressure at the bottom in lb/ft^2?
A. 25
B. 35
C. 40
D. 50

12. The figure shows a crank attached to a rod and piston. When the crank turns, the piston moves in the cylinder. The piston will be at the top of the cylinder if the crank makes



A. a ¼ turn
B. a ½ turn
C. a ¾ turn
D. one complete turn

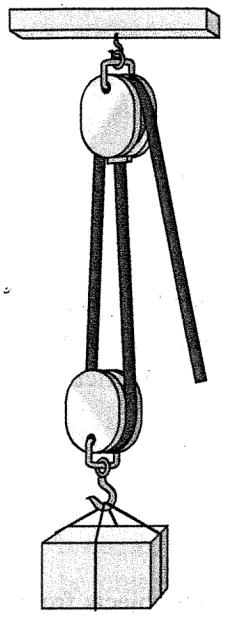
13. How much effort is needed to roll a 120-lb drum up a ramp 30 ft long and 3 ft high at its high end? (Ignore the effect of friction.)
A. 6 lb
B. 9 lb
C. 10 lb
D. 12 lb

14. If you pulled the following objects from a pot of hot water, which would seem hottest to your hand?
A. wooden spoon
B. metal spoon
C. plastic spoon
D. paper straw

15. A gear and pinion have a ratio of 6 to 1. If the gear is rotating at a speed of 150 revolutions per minute (rpm), the speed of the pinion is most nearly
A. 900 rpm
B. 750 rpm
C. 150 rpm
D. 25 rpm

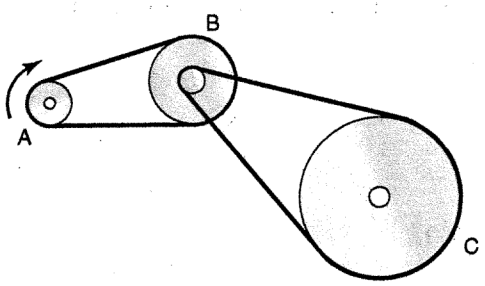
16. A spring, a device that can resume its original shape after bending, is best made from which of the following materials?
    A. ceramic
    B. paper
    C. steel
    D. wood

17. What is the mechanical advantage in this pulley system?



    A. 2
    B. 3
    C. 4
    D. 6

18. If pulley A rotates as shown, pulley C will rotate

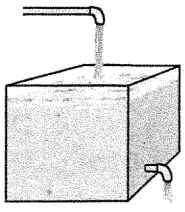


    A. faster, in the same direction.
    B. slower, in the same direction.
    C. faster, in the opposite direction.
    D. slower, in the opposite direction.

19. If you wanted to hit a heavy nail, you might choose a hammer with a
    A. lighter head.
    B. longer handle.
    C. lead head.
    D. shiny striking surface.

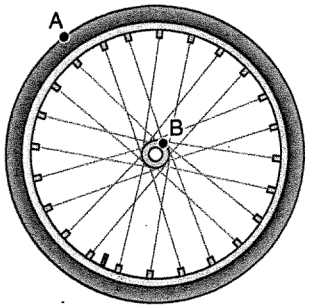
20. A sheet metal screw is likely to be _____ than a wood screw.
    A. longer
    B. shorter
    C. harder
    D. softer

21. The tank shown below holds 100 gallons of water. The pipe is delivering 5 gallons/second at the top, and the pipe at the bottom is removing 100 gallons/minute. How many gallons will remain in the tank after 2 minutes?



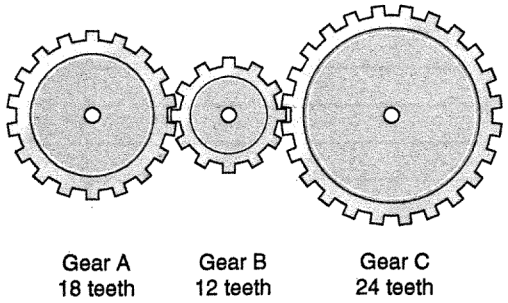
    A. 200
    B. 300
    C. 500
    D. 700

22. On the bicycle wheel shown, A and B are fixed points. When the wheel turns, which of the following is true?



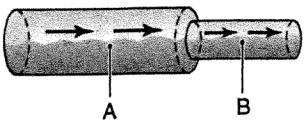
A. Point A travels farther than point B in each turn of the wheel.
B. Point A makes fewer complete turns per minute than does point B.
C. Point B travels farther than point A in each turn of the wheel.
D. Point A turns in complete circles, but point B does not turn.

23. If gear A is rotating at 200 rpm, how fast will gear C be rotating?



A. 100 rpm
B. 150 rpm
C. 300 rpm
D. 400 rpm

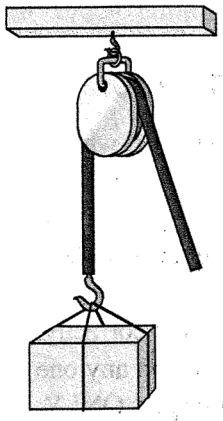
24. When water flows in the direction shown, pressure at point B will be



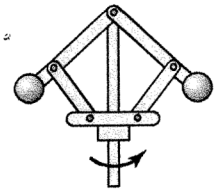
A. higher, and water velocity will be higher.
B. higher, and water velocity will be lower.
C. lower, and the water velocity will be higher.
D. lower, but velocity will not change.

25. Gear X, which has 60 teeth, meshes with gear Y, which has 12 teeth. Each time gear X makes one complete rotation, how many rotations does gear Y make?
A. 6
B. 5
C. 4
D. 3

Mechanical Reasoning Test 3

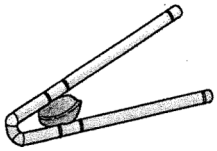


1. The mechanical advantage in the pulley system shown is
   A. 1
   B. 2
   C. 3
   D. 4

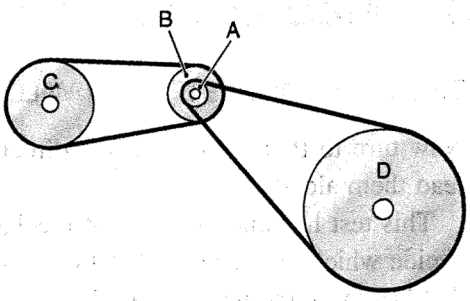


2. This object is a mechanical governor for an engine. What would cause the balls to move outward?
   A. Spring tension
   B. Slower rotation
   C. Faster rotation
   D. Linear momentum

3. When you drag a concrete block across the pavement, one way to reduce the amount of pulling force needed would be to
   A. get a heavier block.
   B. use a better rope.
   C. pull harder.
   D. lubricate the pavement.

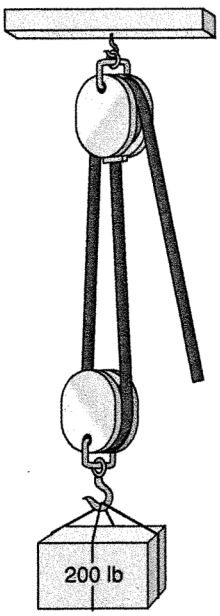


4. What type of simple machine is shown?
   A. Class 1 lever
   B. Class 2 lever
   C. Class 3 lever
   D. Two inclined planes

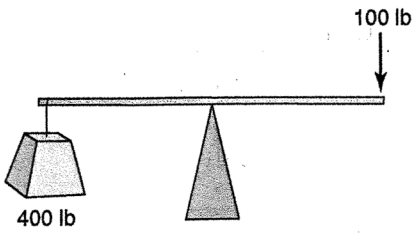


5. Which sheave would be rotating the slowest in this system?
   A. A
   B. B
   C. C
   D. D

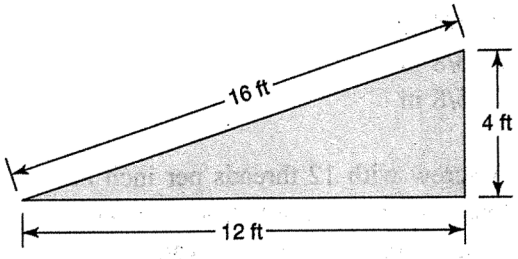
6. A fuel tank is receiving fuel at the rate of 1 gallon per minute. It is supplying an engine that uses 3 gallons per hour. How many gallons of fuel will be in the tank after 1/2 hour, assuming the tank was empty at the start?
   A. 18.5
   B. 28.5
   C. 31.5
   D. 57



7. What amount of effort would be required to pull on this rope?
   A. 25 lb
   B. 50 lb
   C. 100 lb
   D. 200 lb

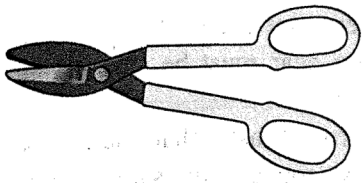


8. Using the weights given, what mechanical advantage would allow a 100 lb effort to raise the 400 lb weight? (Note: the figure is not drawn to scale.)
   A. 2
   B. 4
   C. 8
   D. 16

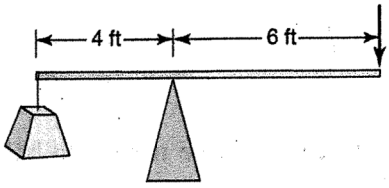


9. What is the mechanical advantage of this inclined plane?
   A. 13/12
   B. 12/13
   C. 13/5
   D. 12/5

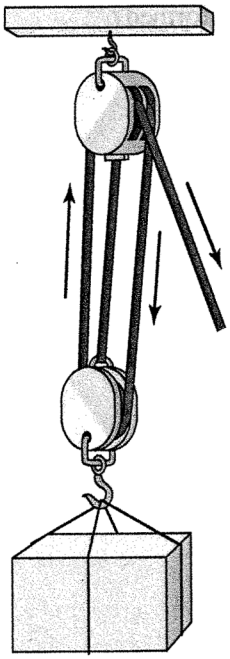
10. Gear A, with 24 teeth, is meshed with gear B, with 36 teeth. When gear A rotates 3 times, how many times will gear B rotate?
    A. 2
    B. 3
    C. 4
    D. 6



11. This tool combines which simple machines?
    A. Lever and wheel and axle
    B. Inclined plane and pulley
    C. Lever and inclined plane
    D. Pulley and wheel and axle

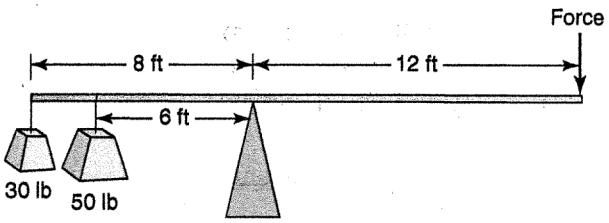


12. What is the mechanical advantage of this lever?
    A. 0.5
    B. 1.5
    C. 2
    D. 3



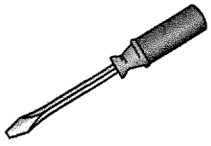
13. In this figure, pulling 12 feet of rope will raise the weight
    A. 2 feet
    B. 3 feet
    C. 4 feet
    D. 8 feet

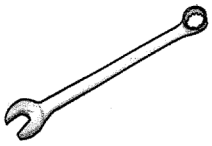
14. When two gears are engaged,
    A. the driving gear must be smaller than the driven gear.
    B. one must rotate faster than the other.
    C. they always rotate at the same speed.
    D. they always rotate in opposite directions.

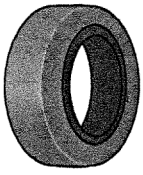


15. How much force would be needed to balance this lever?
    A. 12 lb
    B. 25 lb
    C. 35 lb
    D. 45 lb

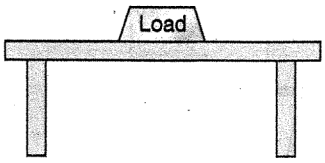
16. Which of these items would return to its original shape after being deformed?

A. 

B. 

C. 

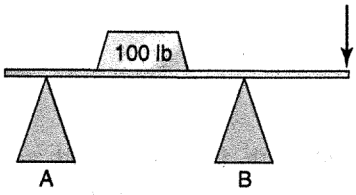
D. 



17. What would help the beam carry a heavier load?
    A. Split the beam in two.
    B. Add a post under the load.
    C. Coat the beam with oil.
    D. Remove one post and turn the other into a fulcrum.

18. A bolt has 8 threads per inch. How far does it move if you tighten it five turns, and then loosen it three turns?
    A. 1/8 in
    B. 1/4 in
    C. 3/8 in
    D. 5/8 in

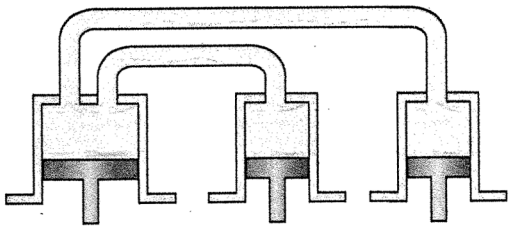
19. A screw with 12 threads per inch has _____ than a screw with 8 threads per inch.
    A. a larger mechanical advantage
    B. a smaller mechanical advantage
    C. more strength
    D. less strength



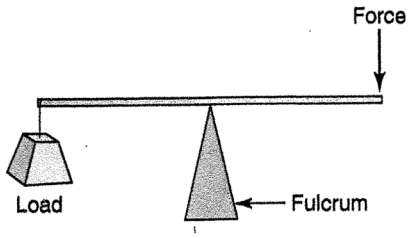
20. What would happen if you added a force at the arrow?
    A. Load would not change at A, and it would increase at B.
    B. Load would not change at A, but it would increase at B.
    C. Load would increase at A and decrease at B.
    D. Load would decrease at A and increase at B.

21. When you add water to a tank, water pressure on the bottom will
    A. stay the same.
    B. decrease.
    C. increase.
    D. depend on temperature.

22. If a bicycle rider changes to a smaller gear on the rear of the bike and wants to go the same speed,
    A. The rider must place more force on the pedals.
    B. The rider can put less force on the pedals.
    C. The rider need not change the force on the pedals.
    D. The rider should put more force on the left pedal and less force on the right pedal.



23. In the hydraulic system shown, where is the greatest pressure?
    A. A
    B. B
    C. C
    D. Pressure is the same at all points.

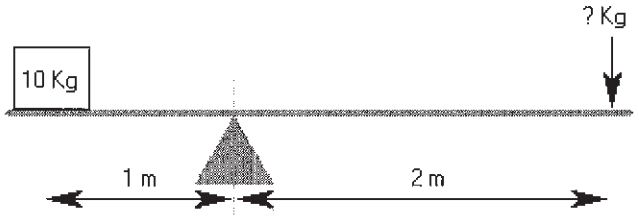


24. Moving the fulcrum closer to the load will
    A. increase the mechanical advantage.
    B. decrease the mechanical advantage.
    C. not change the mechanical advantage.
    D. allow you to lift farther with the lever.

25. What would you use to prevent a nut from moving on a bolt?
    A. Lock washer
    B. Lock nut
    C. Degreaser
    D. A and B

Mechanical Aptitude Test 1

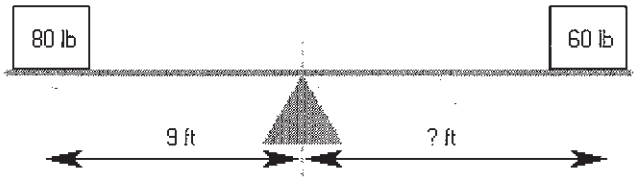
1) How much weight is required to balance the lever?



A	B	C	D	E
15Kg	5Kg	10Kg	7.5Kg	20Kg

A B C D E

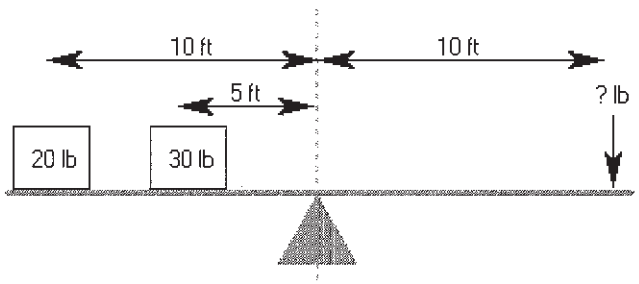
2) How far from the fulcrum does the 60 lb weight need to be to balance the lever?



A	B	C	D	E
9 ft	7 ft	14 ft	12 ft	10 ft

A B C D E

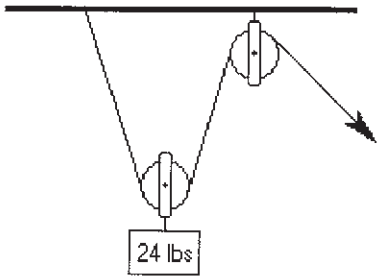
3) How much weight is required to balance the lever?



A	B	C	D	E
30 lbs	25 lbs	28 lbs	40 lbs	35 lbs

A B C D E

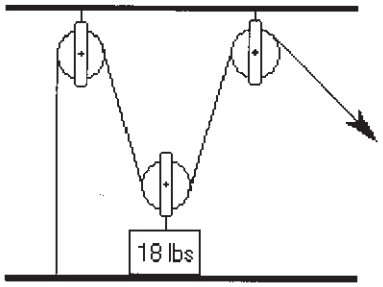
4) Approximately how much force is needed to lift the weight?



A	B	C	D	E
24 lbs	10 lbs	48 lbs	12 lbs	18 lbs

A B C D E

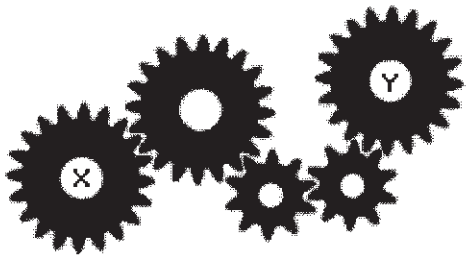
5) Approximately how much force is needed to lift the weight?



A	B	C	D	E
36 lbs	10 lbs	18 lbs	9 lbs	14 lbs

A B C D E

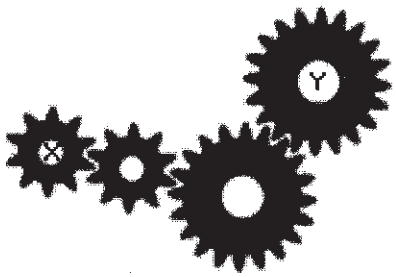
6) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	c/w 20 rpm

A B C D E

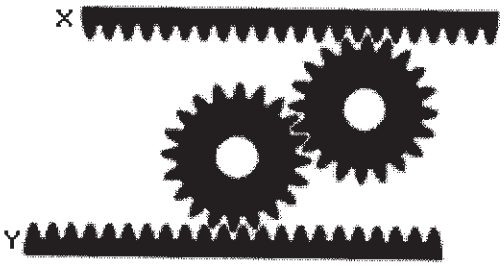
If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	c/w 20 rpm

A B C D E

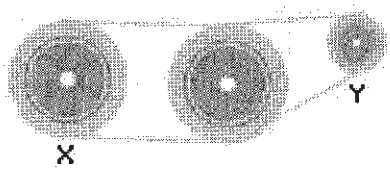
8) If bar Y moves left a constant speed. How does bar X move?



A	B	C	D	E
Left, Faster	Left, Same	Left, Slower	Right, Same	Right, Slower

A B C D E

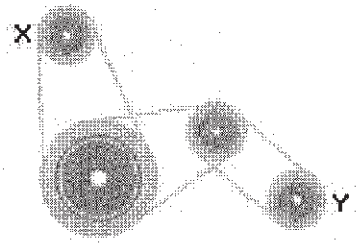
9) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	anti c/w same

A B C D E

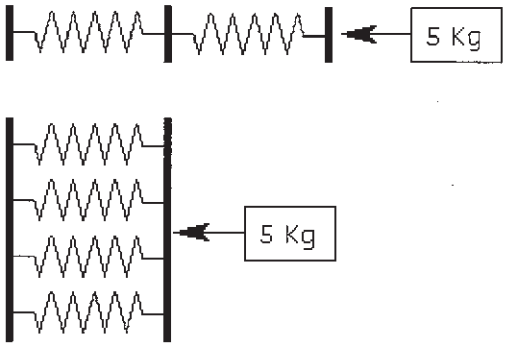
10) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	c/w same

A B C D E

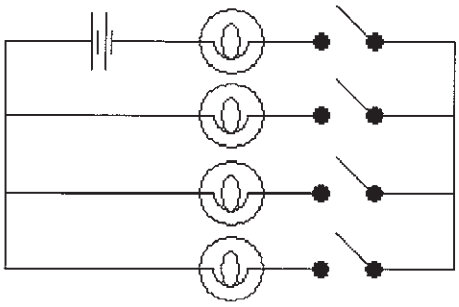
11) A force of 5 Kg compresses the springs in series 10cm. What will be the total distance that the springs in parallel are compressed?



A	B	C	D	E
2.5 cms	5 cms	7.5 cms	10 cms	15 cms

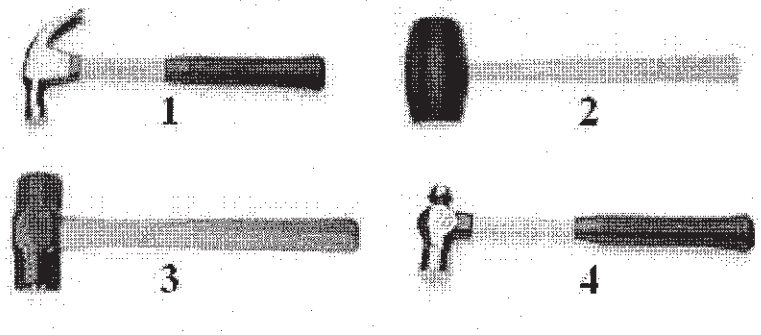
A B C D E

12) In the circuit shown, how many switches need to be closed to light up one bulb?



A	B	C	D	E
None	One	Two	Three	Four

A B C D E



13) Which is the most suitable tool for breaking up concrete?

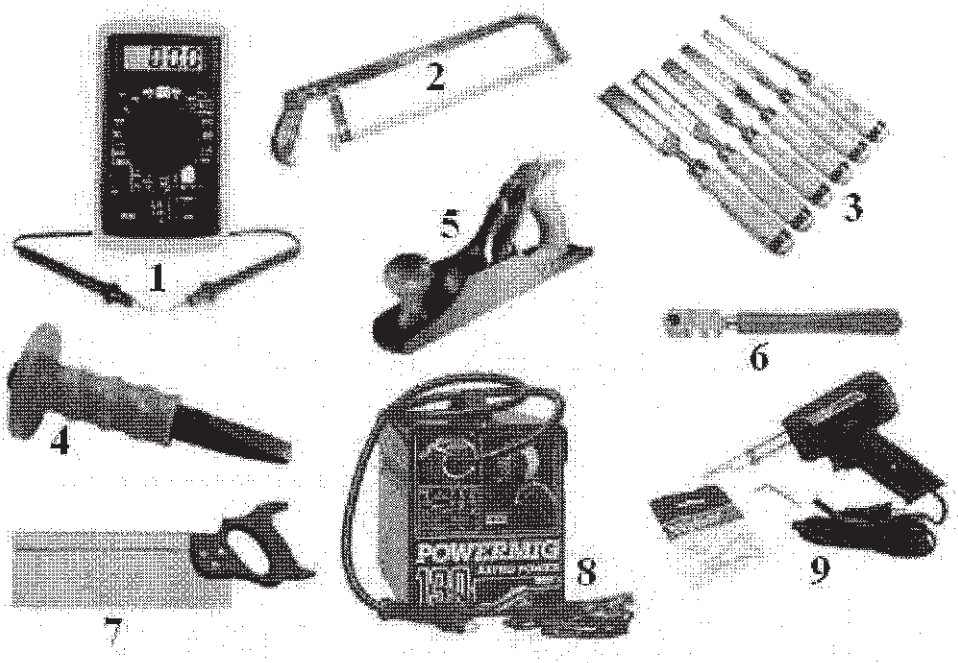
A	B	C	D	E
None	1	2	3	4

A B C D E

14) Which is the most suitable tool for assembling a friction fit wooden frame?

A	B	C	D	E
None	1	2	3	4

A B C D E



15) Which tool or combination of tools would be most useful for general woodwork?

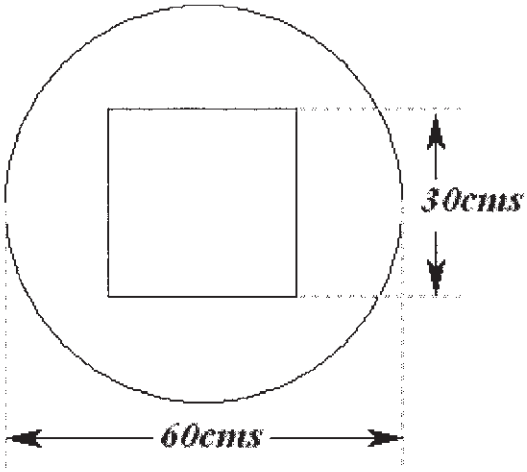
A	B	C	D	E
4 & 2	3, 5 & 7	2, 4 & 6	4 & 7	3 & 6

A B C D E

16) Which tool or combination of tools would be most useful for repairing a broken radio?

A	B	C	D	E
1 & 8	3, 5 & 7	8	1 & 9	3 & 6

A B C D E



The sketch above shows a component which is stamped out of sheet steel. The square in the center is discarded. These components are stamped out of a continuous steel coil with a width of 70 cms. The stamping process requires a gap of 25mm between each component. The steel coil is supplied in lengths of 25 meters costing $200.

17) What is the approximate area of the remaining shape in square centimetres?

A	B	C	D	E
1938	1855	1926	1880	1760

A B C D E

18) What is the approximate percentage of steel wasted including the center square?

A	B	C	D	E
56%	50%	62%	48%	52%

A B C D E

19) Assuming minimal wastage, how many components can be produced from each 25 meter coil?

A	B	C	D	E
38	40	36	42	37

A B C D E

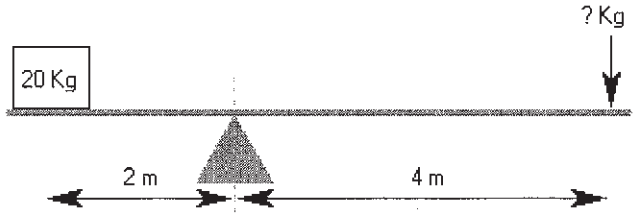
20) What is the approximate cost of a component if the scrap is sold at 50% of cost?

A	B	C	D	E
$3.60	$3.15	$3.55	$5.00	$4.85

A B C D E

Mechanical Aptitude Test 2

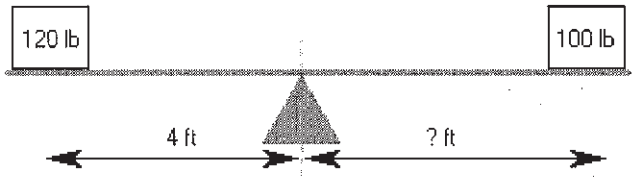
1) How much weight is required to balance the lever?



A	B	C	D	E
15Kg	5Kg	10Kg	7.5Kg	20Kg

A B C D E

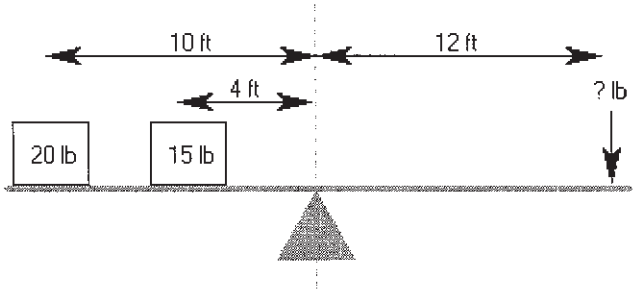
2) How far from the fulcrum does the 100 lb weight need to be to just tip the lever?



A	B	C	D	E
4 ft 8 inches	4 ft 6 inches	5 ft	4 ft 10 inches	4 ft

A B C D E

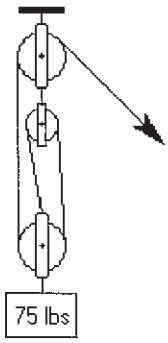
3) How much weight is required to just tip the lever?



A	B	C	D	E
22 lbs	25 lbs	28 lbs	40 lbs	35 lbs

A B C D E

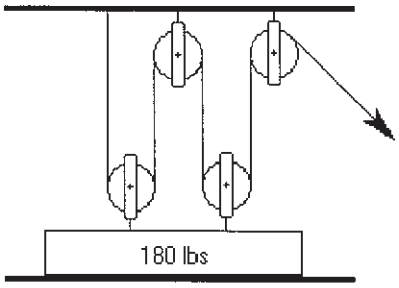
4) Approximately how much force is needed to lift the weight?



A	B	C	D	E
75 lbs	35.5 lbs	25 lbs	50 lbs	15 lbs

A B C D E

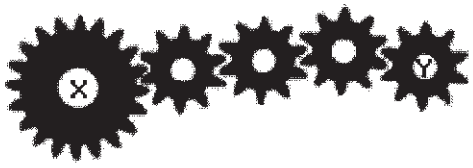
5) Approximately how much force is needed to lift the weight?



A	B	C	D	E
30 lbs	45 lbs	60 lbs	90 lbs	120 lbs

A B C D E

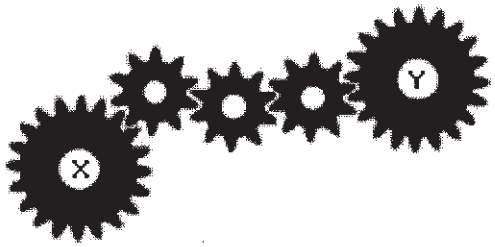
6) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 20 rpm	anti c/w 5 rpm	anti c/w 20 rpm

A B C D E

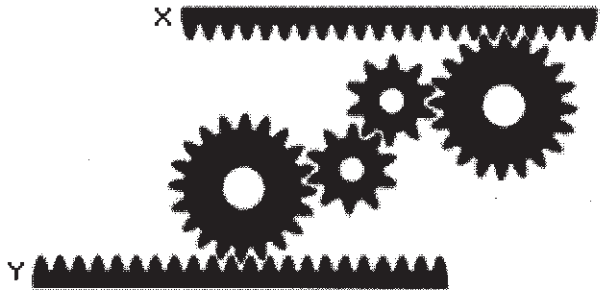
7) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	c/w 20 rpm

A B C D E

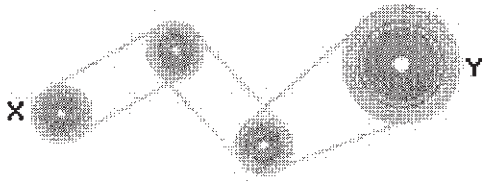
8) If bar Y moves left a constant speed. How does bar X move?



A	B	C	D	E
Left, Faster	Right, Same	Left, Slower	Left, Same	Right, Slower

A B C D E

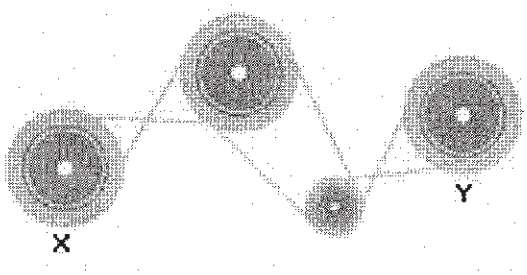
9) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	anti c/w same

A B C D E

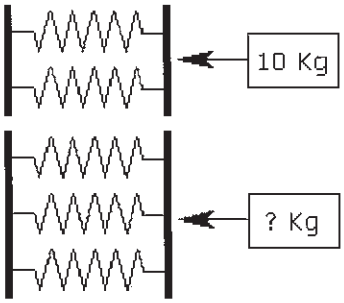
10) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	c/w same

A B C D E

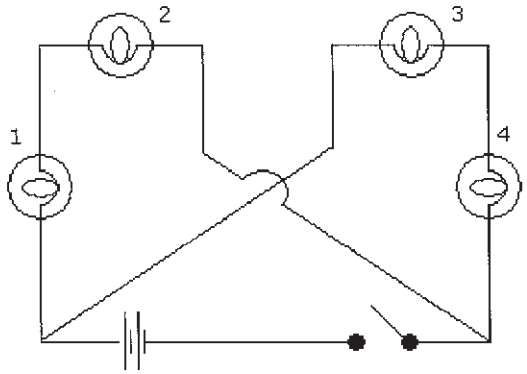
11) A force of 10 Kg compresses the two springs in parallel 10cm. How much force is required to compresses three springs in parallel 10cm?



A	B	C	D	E
5 Kg	10 Kg	7.5 Kg	12 Kg	15 Kg

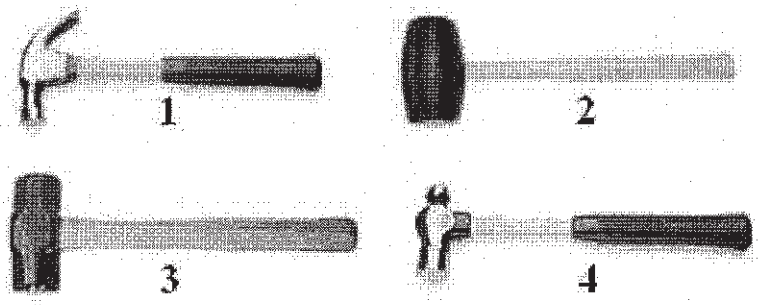
A B C D E

12) If bulb 1 is removed, how many bulbs will light up when the switch is closed?



A	B	C	D	E
None	One	Two	Three	Four

A B C D E



13) Which is the most suitable tool for general carpentry?

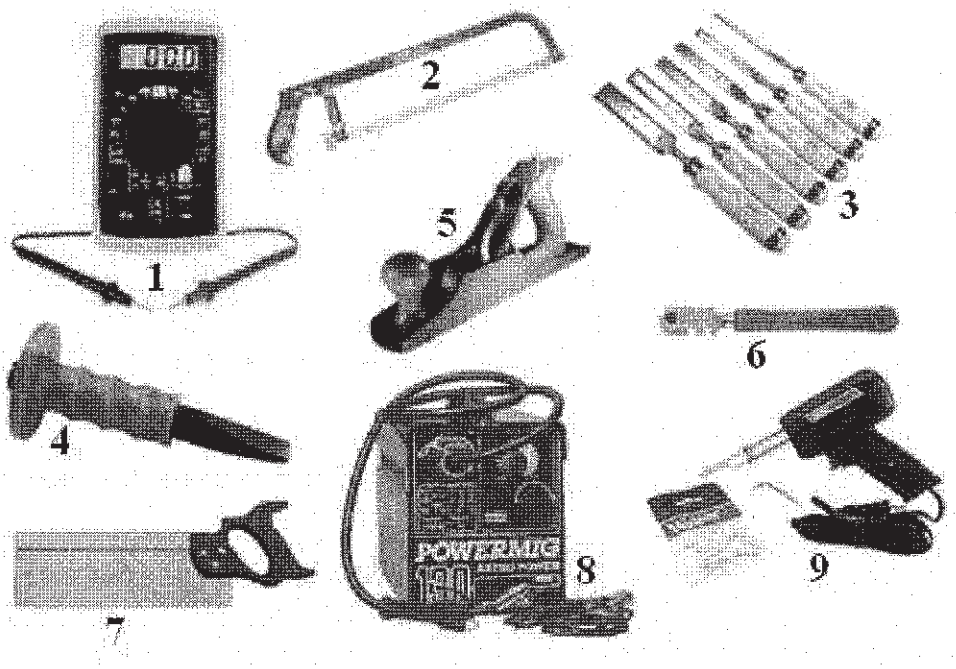
A	B	C	D	E
None	1	2	3	4

A B C D E

14) Which is the most suitable tool for general metalwork?

A	B	C	D	E
None	1	2	3	4

A B C D E



15) Which tool or combination of tools would be most useful for fitting an entertainment system to a vehicle?

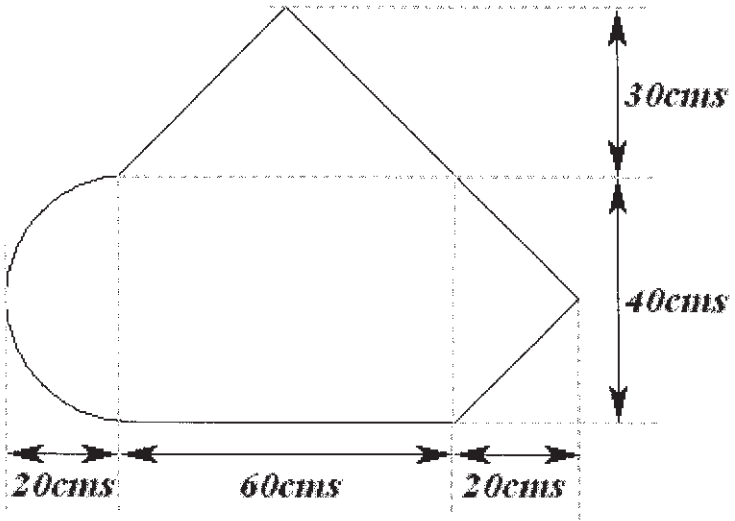
A	B	C	D	E
1 & 9	6	8	2 & 8	9

A B C D E

16) Which tool or combination of tools would be most useful for constructing a mild steel frame?

A	B	C	D	E
3 & 4	9	1 & 9	2 & 8	6

A B C D E



The sketch above shows a component which is stamped out of sheet steel. These components are stamped out of a continuous steel coil with a width of 75 cms. The stamping process requires a gap of 25mm between each component. The steel coil is supplied in lengths of 30 meters costing $200.

17) What is the approximate area of the component in square centimetres?

A	B	C	D	E
4688	4470	4562	4860	4328

A B C D E

18) What is the approximate percentage of steel wasted?

A	B	C	D	E
42%	35%	44%	37%	39%

A B C D E

19) How many components can be produced from each 30 meter coil?

A	B	C	D	E
30	29	32	37	34

A B C D E

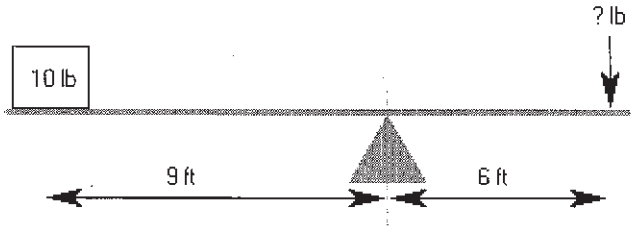
20) What is the approximate cost of a component if the scrap is sold at 50% of cost?

A	B	C	D	E
$4.40	$5.80	$5.66	$5.40	$6.66

A B C D E

Mechanical Aptitude Test 3

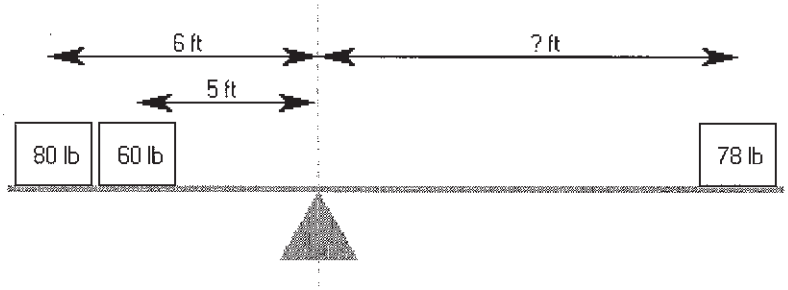
1) How much weight is required to balance the lever?



A	B	C	D	E
15 lbs	12 lbs	18 lbs	16 lbs	20 lbs

A B C D E

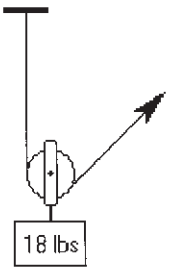
2) How far from the fulcrum does the 78 lb weight need to be to balance the lever?



A	B	C	D	E
6 ft	11 ft	10 ft	8ft	12 ft

A B C D E

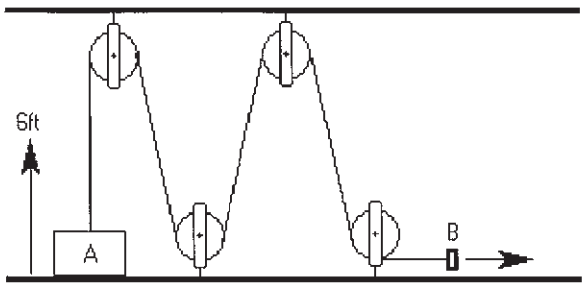
3) Approximately how much force is needed to lift the weight?



A	B	C	D	E
9 lbs	18 lbs	6 lbs	24 lbs	10 lbs

A B C D E

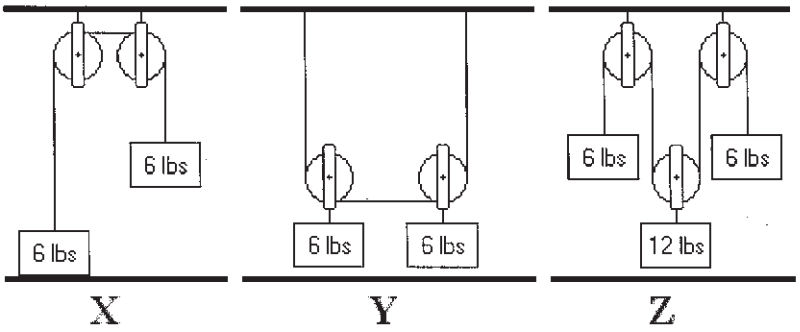
4) How far does B need to move to lift the weight 6 feet?



A	B	C	D	E
3 ft	6 ft	12 ft	8 ft	18 ft

A B C D E

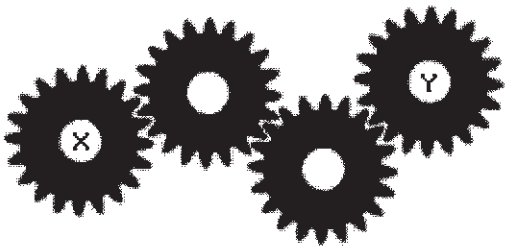
5) Which of the pulley systems shown are stable?



A	B	C	D	E
X only	Y only	Z only	X & Z	Y & Z

A B C D E

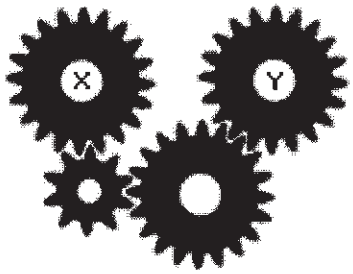
6) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	c/w 20 rpm

A B C D E

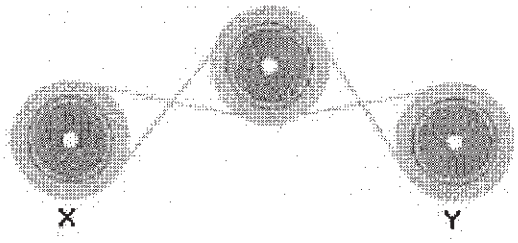
7) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	c/w 20 rpm

A B C D E

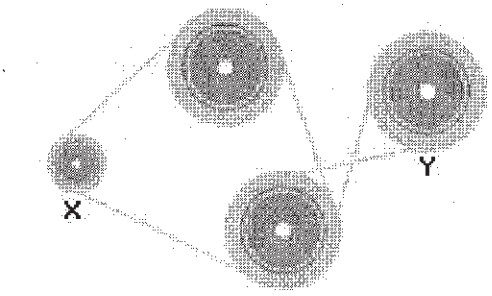
8) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	c/w same

A B C D E

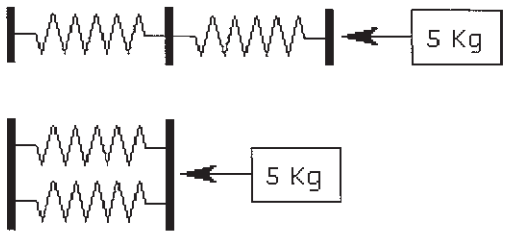
9) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	c/w same

A B C D E

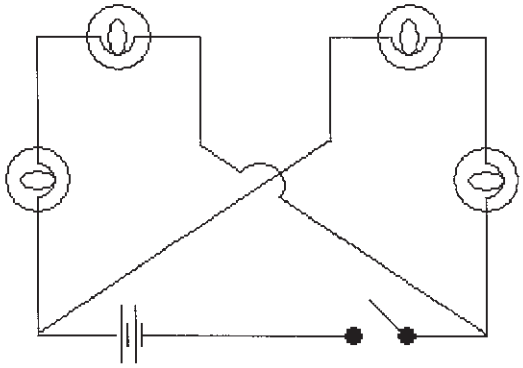
10) A force of 5 Kg compresses the springs in series 10cm. What will be the total distance that the springs in parallel are compressed?



A	B	C	D	E
10 cms	5 cms	2.5 cms	7.5 cms	15 cms

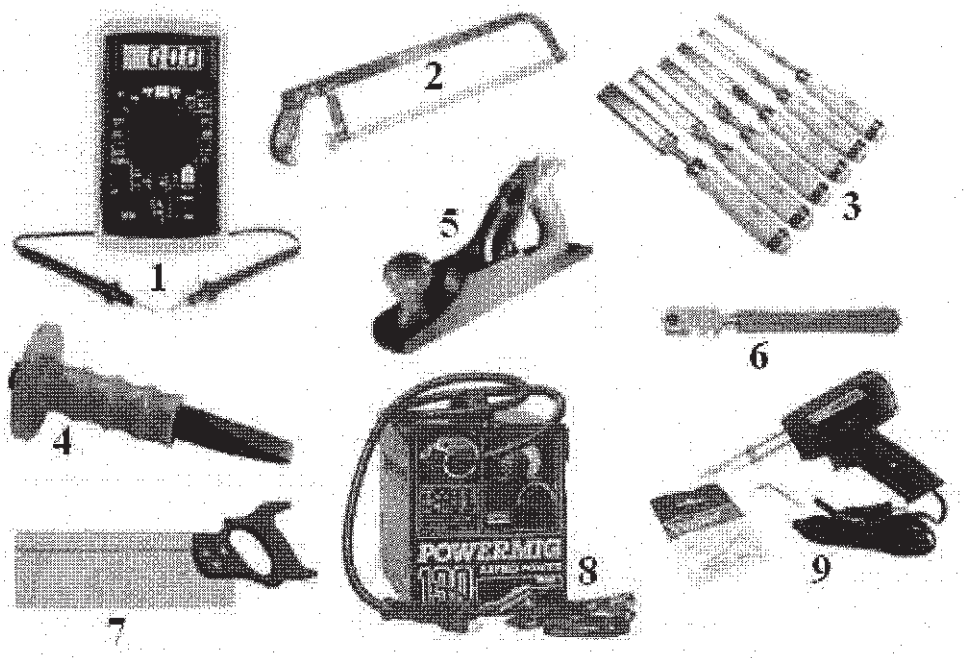
A B C D E

11) In the circuit shown, how many bulbs will light when the switch is closed?



A	B	C	D	E
None	One	Two	Three	Four

A B C D E



12) Which tool or combination of tools would be most useful for working with sheet glass?

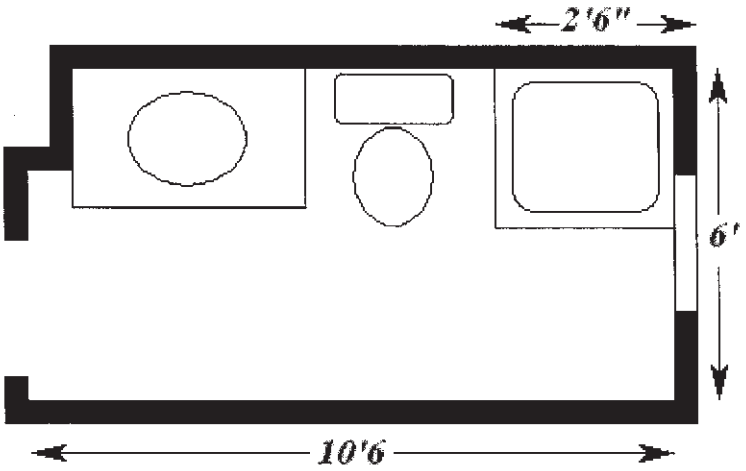
A	B	C	D	E
4 & 2	6	9	4	3 & 6

A B C D E

13) Which tool or combination of tools would be most useful for auto body repair work?

A	B	C	D	E
1 & 8	3, 5 & 7	8	1 & 9	3 & 6

A B C D E



The sketch shows the floor plan of a bathroom. The shower tray is 2'6" square and is fixed to the floor. The toilet and washbasin are both wall mounted.

14) Allowing for 15% wastage, approximately how many square yards of floor tiles should be ordered?

A	B	C	D	E
7.25	6.25	9.25	5.50	8.50

A B C D E

15) The floor tiles measure 6" square and can be laid at a rate of 30 per hour. Approximately how long will it take to tile the floor?

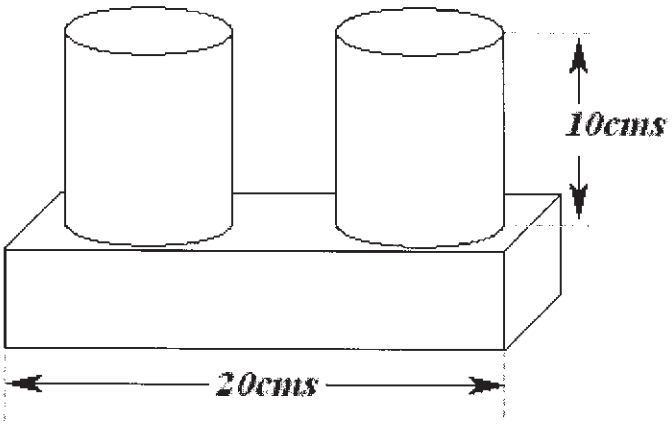
A	B	C	D	E
14 hrs	4 hrs	12 hrs	8 hrs	10 hrs

A B C D E

16) The bathroom is 8' high, the window measures 2' square and the door measures 7' x 2'6". How many square yards is the remaining wall area of the room?

A	B	C	D	E
32	22	24	25	27

A B C D E



The sketch shows a component made from 5cm square bar and 5cm diameter rod. The density of steel is 8g per cubic centimetre. For shipping purposes the components are packed into individual boxes before being packed into shipping crates measuring approximately 0.25m x 0.3m x 0.4m. Shipping crates are packed on pallets to a maximum weight of 800 Kg.

17) What is the approximate total volume of the component in cubic centimetres?

A	B	C	D	E
655	788	967	422	892

A B C D E

18) What is the approximate weight of the component?

A	B	C	D	E
72.4 Kg	7.14 Kg	7.34 Kg	14.4 Kg	5.14 Kg

A B C D E

19) How many boxed components can be fitted into a shipping crate?

A	B	C	D	E
48	24	22	20	18

A B C D E

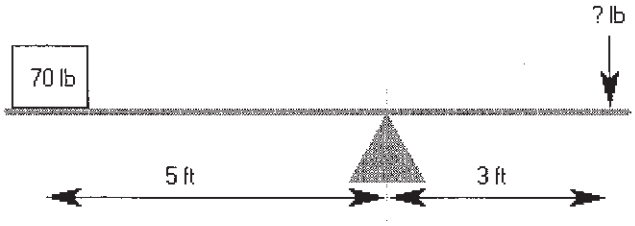
20) How many shipping crates can be fitted onto a palette?

A	B	C	D	E
5	4	7	6	12

A B C D E

Mechanical Aptitude Test 4

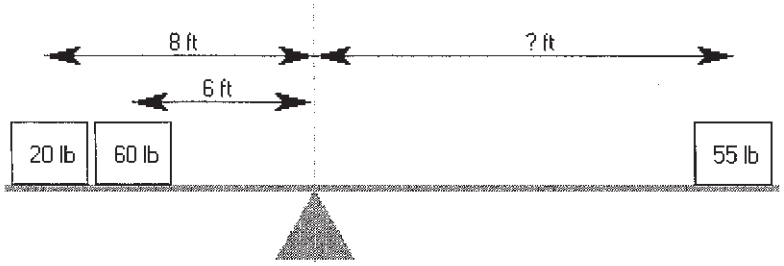
1) How much weight is required to just tip the lever?



A	B	C	D	E
115 lbs	112 lbs	118 lbs	116 lbs	117 lbs

A B C D E

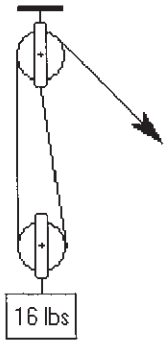
2) How far from the fulcrum does the 55 lb weight need to be to just tip the lever?



A	B	C	D	E
6 ft	9 ft 6 inches	10 ft 6 inches	8ft 6 inches	10 ft

A B C D E

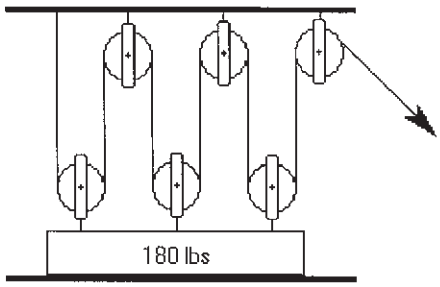
3) Approximately how much force is needed to lift the weight?



A	B	C	D	E
9 lbs	8 lbs	6 lbs	4 lbs	16 lbs

A B C D E

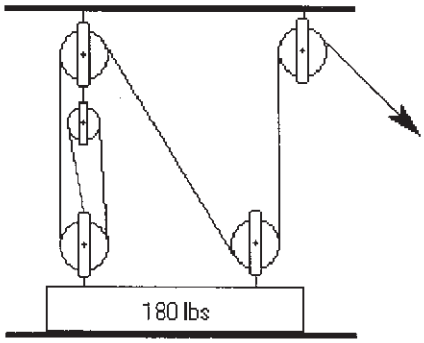
4) Approximately how much force is needed to lift the weight?



A	B	C	D	E
15 lbs	30 lbs	45 lbs	60 lbs	90 lbs

A B C D E

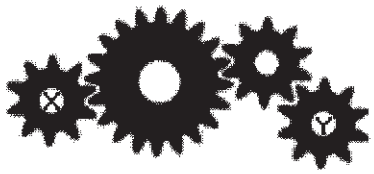
5) Approximately how much force is needed to lift the weight?



A	B	C	D	E
30 lbs	36 lbs	45 lbs	60 lbs	90 lbs

A B C D E

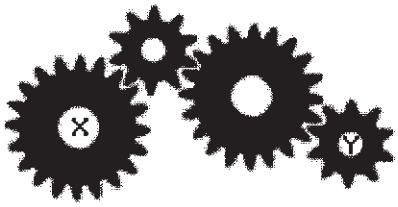
6) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	c/w 20 rpm

A B C D E

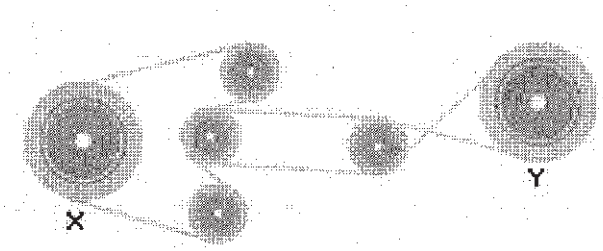
7) If gear X turns clockwise at a constant speed of 10 rpm. How does gear Y turn?



A	B	C	D	E
anti c/w 10 rpm	c/w 10 rpm	c/w 5 rpm	anti c/w 5 rpm	anti c/w 20 rpm

A B C D E

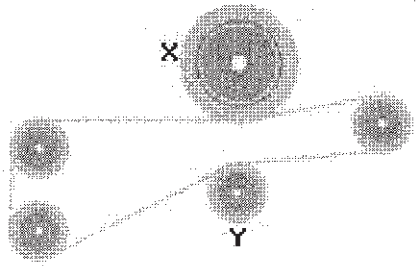
8) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	c/w same

A B C D E

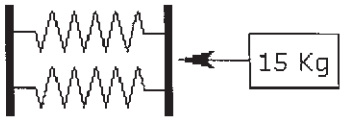
9) If drive wheel X rotates clockwise at a speed of 10 rpm. How does wheel Y turn?



A	B	C	D	E
anti c/w faster	c/w slower	c/w faster	anti c/w slower	c/w same

A B C D E

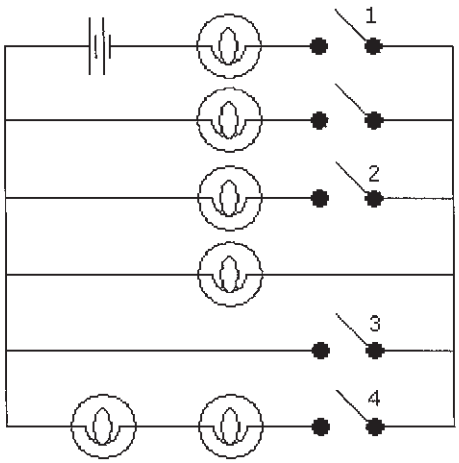
10) A force of 15 Kg compresses the parallel in series 10cm. What will be the total distance that the springs in series are compressed?



A	B	C	D	E
10 cms	5 cms	20 cms	7.5 cms	15 cms

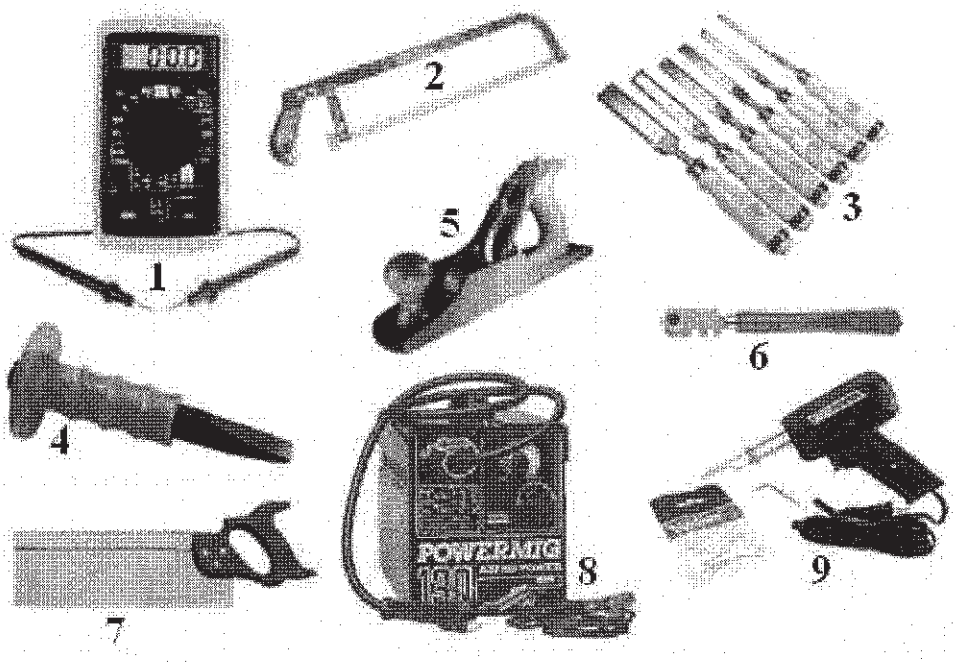
A B C D E

11) How many bulbs will light when switches 1, 2, 3 and 4 are closed?



A	B	C	D	E
None	One	Two	Three	Four

A B C D E



12) Which tool or combination of tools would be most useful for masonry work?

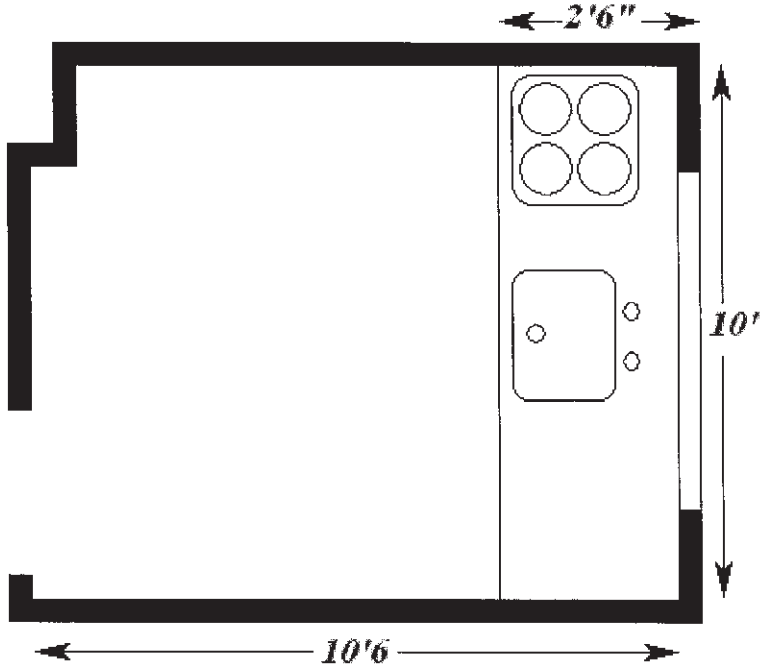
A	B	C	D	E
3	6	4	7	2

A B C D E

13) Which tool or combination of tools would be most useful for fitting a wooden door?

A	B	C	D	E
3,5 & 7	1 & 9	2, 3 & 4	4, 6 & 7	4 & 6

A B C D E



The sketch shows the floor plan of a kitchen. The kitchen units and worktop project 2' 6" from the wall at a height of 36". The window is 7 feet wide and 4 feet high – it is flush with the level of the worktop. The ceiling is 8 feet high. The specification requires 6" x 6" decorative tiles to be fitted above the worktop on three sides to a height of 24".

14) Allowing for 15% wastage, approximately how many tiles should be ordered?

A	B	C	D	E
82	74	64	70	80

A B C D E

15) The door measures 7' x 2'6". Calculate the remaining wall area in square feet (i.e. the area that has not been tiled)

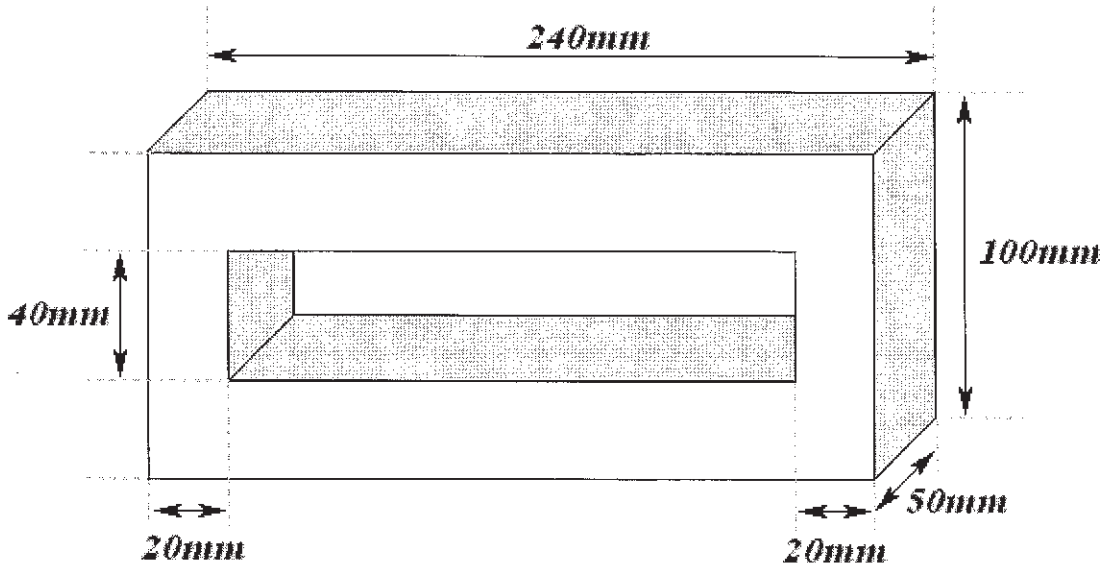
A	B	C	D	E
268	144	306	221	180

A B C D E

16) The walls and the ceiling are to be painted. How many square yards of paint will be required?

A	B	C	D	E
24	36	30	42	26

A B C D E



The sketch shows a component made from titanium. The density of titanium is 4.5g per cubic cm. For shipping purposes the components are packed into individual boxes before being packed into shipping crates measuring 0.24m x 0.3m x 0.4m. Shipping crates are packed on pallets to a maximum weight of 800 Kg.

17) What is the approximate total volume of the component in cubic centimetres?

A	B	C	D	E
800	750	700	680	775

A B C D E

18) What is the approximate weight of the component?

A	B	C	D	E
3.8Kg	4.2Kg	3.6Kg	38Kg	17Kg

A B C D E

19) How many components can be fitted into a shipping crate?

A	B	C	D	E
22	26	18	24	20

A B C D E

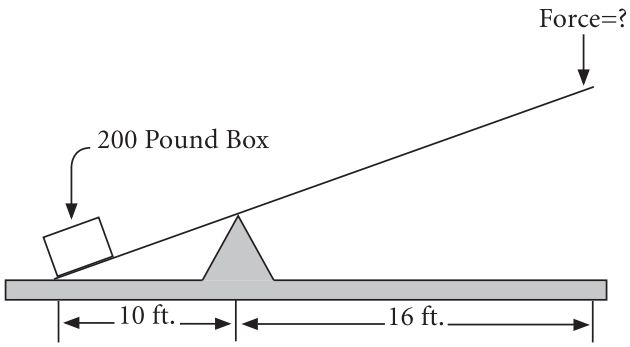
20) How many shipping crates can be fitted onto a palette?

A	B	C	D	E
6	9	8	11	7

A B C D E

Mechanical Insight Test

30 PRACTICE QUESTIONS

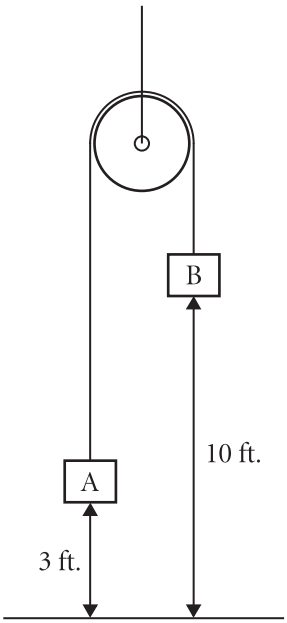


1. In the diagram shown above, Frank must lift a 200-pound box using a lever. How many pounds of force must Frank apply to the right side of the lever to lift the box? w^x

- **a.** 100 pounds
- **b.** 125 pounds
- **c.** 200 pounds
- **d.** 320 pounds

2. What units are used to measure velocity?

- **a.** feet per minute
- **b.** feet per second
- **c.** miles per hour
- **d.** all of the above



3. In the diagram shown above, how much must block A be raised to allow block B to rest on the floor beneath it?

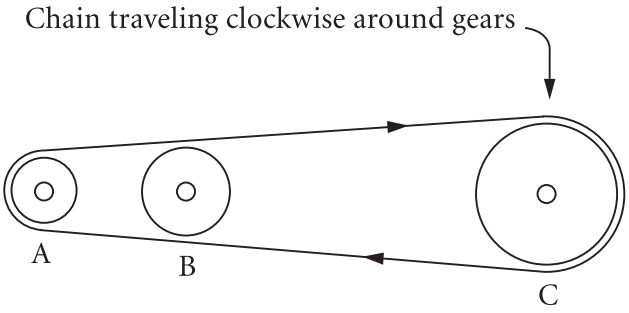
a. 3 feet
b. 10 feet
c. 13 feet
d. 7 feet

4. Which of the following items listed below most resembles a lever?

a. a seesaw
b. an elevator
c. a car
d. a door

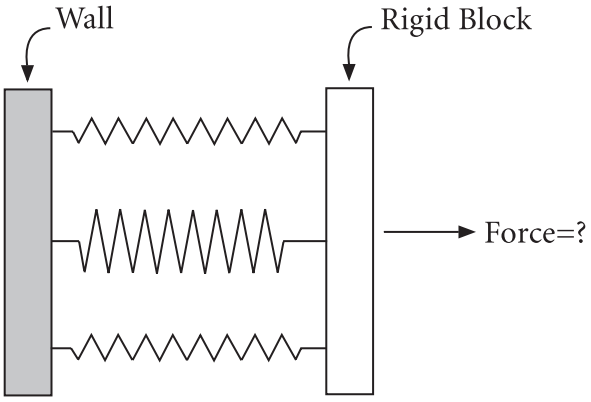
5. Lori and Steve are sitting in separate cars at a stop sign. Lori accelerates at twice the rate that Steve accelerates. After five minutes of constant acceleration, who has traveled a longer distance?

a. Steve
b. Lori
c. they have traveled the same distance
d. not enough information to answer the question



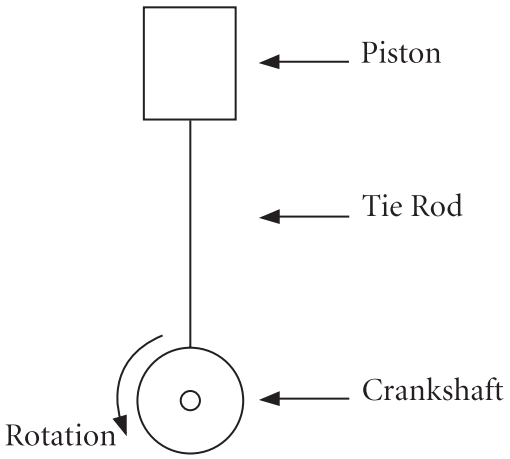
6. In the diagram shown above, gears A, B, and C are connected by a chain. The diameters of the gears are 1 inch, 2 inches, and 4 inches respectively. If gear A is turning at 20 revolutions per minute (RPM), what is the turning rate of gear C?

a. 5 RPM
b. 20 RPM
c. 40 RPM
d. 80 RPM



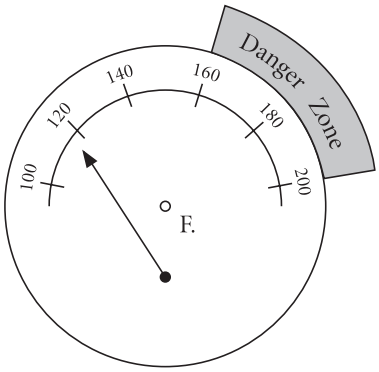
7. Three springs are arranged in parallel between a wall and a rigid block, as shown above. The spring constants are 5 pounds per inch, 12 pounds per inch, and 5 pounds per inch respectively. What force is required to move the block 2 inches to the right?

a. 12 pounds
b. 44 pounds
c. 22 pounds
d. 10 pounds



8. The figure above shows a piston that is connected to a crankshaft by a tie rod. The crankshaft has a radius of 1.0 inch. If the crankshaft rotates 180 degrees (one half of a revolution), how far downward will the piston be pulled?

a. 0.5 inches
b. 1.0 inch
c. 1.33 inches
d. 2.0 inches



9. On the temperature gauge shown above, what is the maximum recommended operating temperature (degrees Fahrenheit) for this gauge in order to remain in a safe zone?

a. 120
b. 140
c. 160
d. 180

10. A concrete beam has a maximum strength of 3,000 psi (pounds per square inch). In an experiment, a 500-pound weight is placed in the center of the beam, and the stress in the beam is measured to be 1,000 psi. If the stresses in the beam continue to increase at the same rate with added weight, how much additional weight can be added to the same location on the beam before the beam will break?

a. 500 pounds
b. 1,000 pounds
c. 1,500 pounds
d. 3,000 pounds

11. Two cars have the same weight and the same type of engine and travel at the same speed. One is a boxy minivan and the other a low, sleek sports car. Which factor below best explains why the sports car gets better gas mileage than the minivan?

a. friction
b. wind resistance
c. acceleration
d. all of the above

12. Which principle of mechanical motion is used in the design of a roller coaster?

a. momentum
b. friction
c. acceleration
d. all of the above

13. Two balls of the same density, one large and one small, are rolled toward each other at the same speed. When they collide, what will happen to the smaller ball?

- **a.** It will be propelled backwards in the opposite direction.
- **b.** It will continue forward in the same direction.
- **c.** It will stop and stay at the point of impact.
- **d.** It will jump over the heavier ball.

14. A seesaw works best when both people weigh the same. This demonstrates which principle of mechanical motion?

- **a.** relative velocity
- **b.** centrifugal force
- **c.** acceleration
- **d.** equilibrium

15. A grandfather clock typically has a long pendulum that swings back and forth to keep time. Which description below best describes the action of this pendulum?

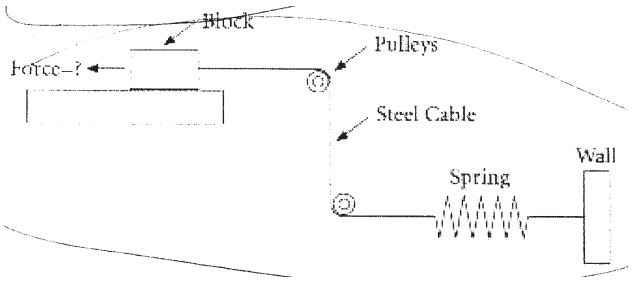
- **a.** periodic motion
- **b.** relative velocity
- **c.** free-falling body
- **d.** all of the above

16. Which term below best describes the OPPOSITE of "an increase in speed"?

- **a.** velocity
- **b.** friction
- **c.** deceleration
- **d.** rotation

17. When a load is applied to a structural beam, which of the following does the beam experience?

- **a.** deflection
- **b.** stress
- **c.** strain
- **d.** all of the above



18. In the diagram shown above, the spring is very stiff and can be stretched 1 inch by a pulling force of 100 pounds. How much force must be applied to the block in order to move the wall 3.5 inches to the left?

- **a.** 100 pounds
- **b.** 300 pounds
- **c.** 350 pounds
- **d.** 3.5 pounds

19. When a cannon ball is fired at an upward angle from the surface of the earth, which of the following causes it to come back to the surface of the earth?

- **a.** friction
- **b.** centrifugal force
- **c.** gravity
- **d.** momentum

20. Which of the following best describes the location of the center of gravity of a steel bar that is four feet long and is the same diameter along its length?

a. two feet from the left end of the bar
b. three feet from the right end of the bar
c. on the right end of the bar
b. on the left end of the bar

21. Which of the following materials is the LEAST elastic?

a. silly putty
b. wax
c. rubber
d. paper

22. Block A is twice as big as Block B. Block B is made of a material that is three times as dense as the material in Block A. Which block is heavier?

a. Block A
b. Block B
c. both blocks weigh the same amount
d. not enough information

23. A block of steel has a density of 0.29 pounds per cubic inch. If the block has dimensions of 1 inch by 1 inch by 2 inches, what is its weight?

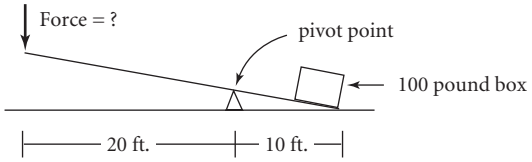
a. 0.29 pounds
b. 0.58 pounds
c. 2.0 pounds
d. 4.0 pounds

24. What is the structural principle behind the use of snowshoes?

a. to spread the load out on the snow
b. to increase the weight on the snow
c. to slow down the person using them
d. to prevent slippage in the snow

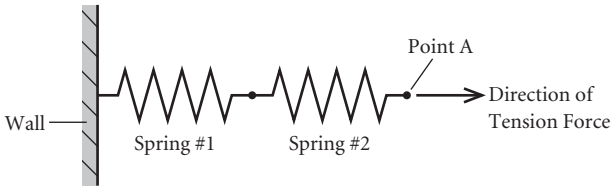
25. There are three beams that are each 10 feet long and all of the same size. One is made of wood, another of steel, and the third of concrete. If identical loads are applied to these three beams, which of the following will occur?

a. The concrete beam will deflect more than the other two.
b. The wood beam will deflect less than the steel beam.
c. The steel beam will deflect less than the wood beam.
d. The wood beam will deflect less than the concrete beam.



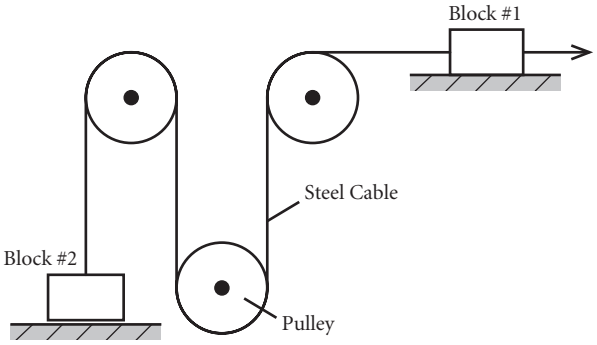
26. In the diagram shown above, Joe must lift a 100-pound box using a lever. How many pounds of force must Joe apply to the left side of the lever to lift the box? ($w \times d_1 = f \times d_2$)

a. 100 pounds
b. 200 pounds
c. 50 pounds
d. 33 pounds



27. Two springs are arranged in series as shown above. Spring #1 is very stiff and will become 1 inch longer when a tension force of 10 pounds is applied to it. Spring #2 is very soft and will become 2 inches longer when a tension force of 5 pounds is applied to it. What will be the change in length of the two springs (that is, how far will point A move to the right) when a force of 20 pounds is applied?

a. 10 inches
b. 6 inches
c. 8 inches
d. 3 inches

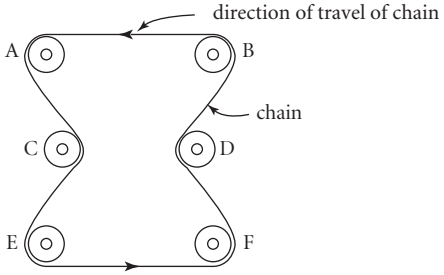


28. In the diagram shown above, if block #1 is moved 10 feet to the right, how far upward is block #2 lifted?

a. 3 feet
b. 5 feet
c. 10 feet
d. 20 feet

29. Which of the following groups of items listed below consists entirely of fasteners—that is, of devices that are used to connect two items together?

a. chairs, tables, and windows
b. string, scissors, and glue
c. rivets, levers, and bolts
d. snaps, buckles, and buttons



30. In the diagram shown above, which gears are turning clockwise?

a. A, C, and E
b. B, D, and F
c. C and D
d. E and F