Consider two hosts P and Q connected through a router R. The maximum transfer unit (MTU) value of the link between P and R is 1500 bytes, and between R and Q is 820 bytes.A TCP segment of size 1400 bytes was transferred from P to Q through R, with IP identification value as 0x1234. Assume that the IP header size is 20 bytes. Further, the packet is allowed to be fragmented, i.e., Don't Fragment (DF) flag in the IP header is not set by P.Which of the following statements is/are correct?

A: Two fragments are created at R and the IP datagram size carrying the second fragment is 620 bytes.

B: If the second fragment is lost, R will resend the fragment with the IP identification value 0x1234.

C: If the second fragment is lost, P is required to resend the whole TCP segment.

D: TCP destination port can be determined by analysing only the second fragment.

A is correct as you can follow the process of IPv4 fragmentation and you will get $620B$ fragments as described in the statement. C is correct as fragmentation happened at the router and the sender has no way of knowing what kind of fragmentation occurred, so it will resend the whole TCP segment. For B to be true, the original sender must retransmit the packet data in a datagram with the same IPv4 ID field as before, i.e. $0X1234$. Take a look at RFC 1122 to see what they say about retransmitting with the same ID field (text below). First of all, it says that retaining the ID field is optional. Secondly, it says that due to certain constraints, this is not practical, and therefore not believed to be useful (so it does not really happen in practice). B's statement implies that the router will definitely resend a fragment with $0X1234$ ID, which can only happen if the sender resends the whole segment with the same ID number, but there is no such guarantee. Therefore B is false. When sending an identical copy of an earlier datagram, a host MAY optionally retain the same Identification field in the copy. Some Internet protocol experts have maintained that when a host sends an identical copy of an earlier datagram, the new copy should contain the same Identification value as the original. There are two suggested advantages: (1) if the datagrams are fragmented and some of the fragments are lost, the receiver may be able to reconstruct a complete datagram from fragments of the original and the copies; (2) a congested gateway might use the IP Identification field (and Fragment Offset) to discard duplicate datagrams from the queue. However, the observed patterns of datagram loss in the Internet do not favor the probability of retransmitted fragments filling reassembly gaps, while other mechanisms (e.g., TCP repacketizing upon retransmission) tend to prevent retransmission of an identical datagram [IP:9]. Therefore, we believe that retransmitting the same Identification field is not useful.

A TCP server application is programmed to listen on port number P on host S. A TCP client is connected to the TCP server over the network.Consider that while the TCP connection was active, the server machine S crashed and rebooted. Assume that the client does not use the TCP keepalive timer. Which of the following behaviors is/are possible?

A: If the client was waiting to receive a packet, it may wait indefinitely.

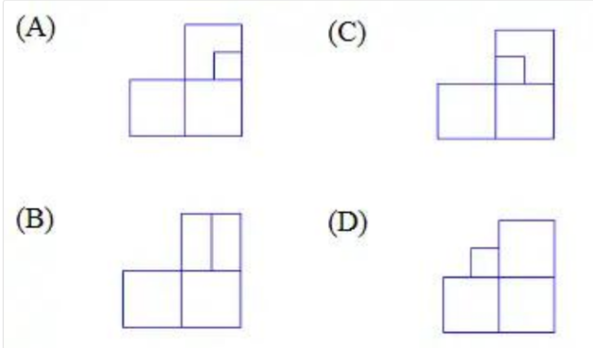
B: The TCP server application on S can listen on P after reboot.

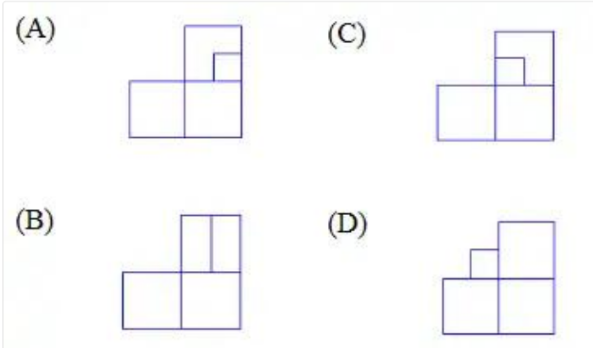
C: If the client sends a packet after the server reboot, it will receive a RST segment.

D: If the client sends a packet after the server reboot, it will receive a FIN segment.

Option A is correct, because client doesn't have a keepalive timer, and the server after a reboot forgets any connection with the client existed. As for option C and D, option D is wrong because there is no reason for a FIN segment to be sent because there is no established connection which can be closed according to the recently rebooted server. As for option C, scroll down to read the paragraph from page 35*** of the documentation, which proves that it is in fact correct. Now, for option B, during the exam i reasoned that there is a distinction between a server machine being rebooted, and a tcp application/process being restarted. For instance, whenever your computer crashes and reboots when you were browsing on google chrome (this was the case atleast a few years ago), did your computer automatically also restart the google chrome application? Obviously not. There are some processes which the computer automatically starts on boot, but those are the exceptions and not the norm. A client or server won't simply restart its previous processes after a crash and reboot, unless it has been configured to do so, and nowhere in the question do i see that the server was a dedicated server running only the said tcp application. The question asks what behaviour is possible on reboot. When such wording is used, it is natural to assume that it means what happens after the reboot without any external interference, human or otherwise. Because if we don't assume this to be true, then a whole lot of things are possible after a system restarts. Here is some supporting text from the standard tcp documentation which you can access following this: Wikipedia → Transmission Control Protocol → RFC Documents → STD 7 - Transmission Control Protocol, Protocol specification (https://tools.ietf.org/html/std7) → Page 32 → Half-Open Connections and Other Anomalies. An established connection is said to be "half-open" if one of the TCPs has closed or aborted the connection at its end without the knowledge of the other, or if the two ends of the connection have become desynchronized owing to a crash that resulted in loss of memory. Such connections will automatically become reset if an attempt is made to send data in either direction. However, half-open connections are expected to be unusual, and the recovery procedure is mildly involved. If at site A the connection no longer exists, then an attempt by the user at site B to send any data on it will result in the site B TCP receiving a reset control message. Such a message indicates to the site B TCP that something is wrong, and it is expected to abort the connection. Assume that two user processes A and B are communicating with one another when a crash occurs causing loss of memory to A's TCP. Depending on the operating system supporting A's TCP, it is likely that some error recovery mechanism exists. When the TCP is up again, A is likely to start again from the beginning or from a recovery point. As a result, A will probably try to OPEN the connection again or try to SEND on the connection it believes open. In the latter case, it receives the error message "connection not open" from the local (A's) TCP. In an attempt to establish the connection, A's TCP will send a segment containing SYN. This scenario leads to the example shown in figure 10. The highlighted words indicate that it isn't always necessary that the tcp process will restart after a crash, and that it is dependent upon the operating system. Given that we don't know what the TCP process is exactly, it could as well be an unimportant process on a non well-known port, which was used for a private connection between the client and the server, which has no specific reason to restart after the server reboots. And until and unless the process restarts, it won't start listening on its configured port number. ***Also on Page 35 → Reset Generation As a general rule, reset (RST) must be sent whenever a segment arrives which apparently is not intended for the current connection. A reset must not be sent if it is not clear that this is the case.

Five cubes of identical size and another smaller cube are assembled as shown in Figure A. If viewed from direction X, the planar image of the assembly appears as Figure B.If viewed from direction Y, the planar image of the assembly (Figure A) will appear as





A: A

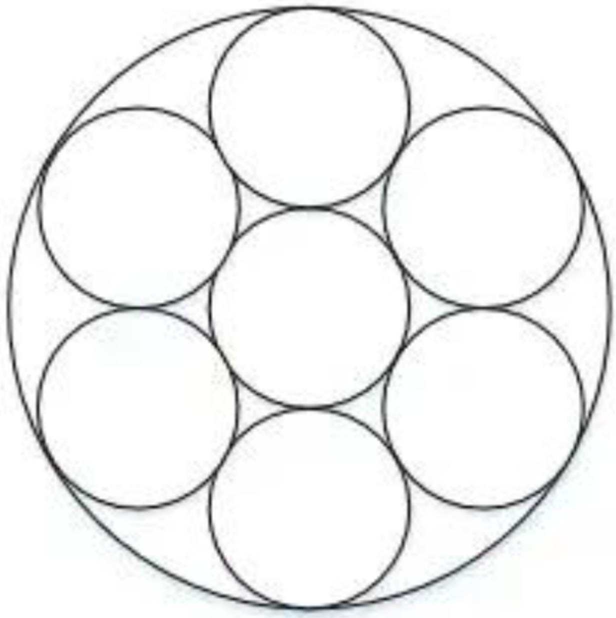
B: B

C: C

D: D

No explanation provi

Seven identical cylindrical chalk-sticks are fitted tightly in a cylindrical container. The figure below shows the arrangement of the chalk-sticks inside the cylinder.The length of the container is equal to the length of the chalk-sticks. The ratio of the occupied space to the empty space of the container is



A: $5/2$

B: $7/2$

C: $9/2$

D: 3

Let the radius of cylinder $= \mathrm{R}$ and the radius of chalk $= r 2r + 2r + 2r = 2$

Volume of cylinder $= \pi \mathrm{R}^2 \ \mathrm{h}$Volume of chalk $= \pi \left(\frac{\mathrm{R}}{3}\right)^2 \ \mathrm{h} \frac{\text{Volume of occupied spa}}{\text{Volume of empty spac}}$

$$\frac{7\pi \frac{R^2}{9} h}{\pi R^2 h - \frac{7\pi R^2}{9}} = \frac{7/9}{2/9} = \left(\frac{7}{2}\right)$$

Both the numerator and the denominator of $frac34$ are increased by a positive integer, x, and those of $frac1517$ are decreased by the same integer. This operation results in the same value for both the fractions.What is the value of x?

A: 1

B: 2

C: 3

D: 4

No explanation provided.