11.5 As described in the text, the PCI-Express bus consists of thirty-two “lanes”. As of January, 2009, each lane is capable of a maximum data rate of 500 MB per second. Lanes are allocated to a device 1, 2, 4, 8, 16, or 32 lanes at a time.

Assume that a PCI-Express bus is to be connected to a high-definition video card that is supporting a 1920×1080 true-color (3 bytes per pixel) progressive scan monitor with a refresh rate of 60 frames per second. How many lanes will this video card require to support the monitor at full capability?

$1920 \times 1080 \times 3 \times 60 = 373{,}248{,}000$ bytes/second

$373248000 / (500 \times 1024 \times 1024) = 1$ lane

11.7 How many PCI-Express lanes are required to support a 10 GB per second Ethernet card?

Each bus consists of two simplex line pairs that carry data, addresses, and control signals simultaneously in both directions at a current maximum rate of approximately 2 GB per second in each direction.

$10 / 2 = 5$ lanes